RAPIDS EVALUATION

PROJECT REPORT

Alberta
ENVIRONMENT

RAPIDS Evaluation
PROJECT REPORT

Prepared for:

Science and Technology Branch
Environmental Sciences Division
Alberta Environment

By

LGS GROUP INC.

March, 2000

Pub. No. T/561
ISBN: 0-7785-1391-2 (Printed Version)
ISBN: 0-7785-1393-9 (On-Line Version)
Web Site: http://www.gov.ab.ca/env/protenf/publications

Although prepared with funding from Alberta Environment (AENV), the contents of this report/document do not necessarily reflect the views or policies of AENV, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

Any questions on this document may be directed to:

Environmental Sciences Division
Alberta Environment
4th Floor, Oxbridge Place
9820 – 106th Street
Edmonton, Alberta T5K 2J6
Phone: (780) 427-5883
Fax: (780) 422-4192
Email: environmental.science@gov.ab.ca

Additional copies of this document may be obtained by contacting:

Information Centre
Alberta Environment
Main Floor, Great West Life Building
9920 – 108th Street
Edmonton, Alberta T5K 2M4
Phone: (780) 944-0313
Fax: (780) 427-4407
Email: env.infocent@gov.ab.ca

SUMMARY

Alberta Environment (AENV) is seeking a system that will satisfy its current and identified future emission inventory requirements.

This project evaluates the Regional Air Pollutant Inventory Development System (RAPIDS) to determine its applicability, its usability, and how electronic data transfer of emissions and other data can be facilitated.

RAPIDS was found to be generally suitable as an emissions inventory system. It provides an excellent data framework to manage emissions inventory information for AENV. It can ensure consistency of information, and it provides standardised methodologies for estimating and reporting emissions. Because RAPIDS was developed and is supported by the Great Lakes Commission to serve as a common emission inventory system for agencies, AENV can potentially participate in a common support and development process for RAPIDS.

As part of the evaluation RAPIDS was presented to selected industry representatives through a one-day workshop and feedback was solicited. RAPIDS can serve as a common emissions inventory system for both AENV and industry, and some participants expressed interest in using RAPIDS as their facility emissions management system.

RAPIDS has the capability to export from one user's system to another, so the submission process can be very straightforward. If some users wish to maintain their own data management system and not use RAPIDS, then a standard data format can be derived.

Through the workshop, RAPIDS was found to be complex to use, and in its current form it may not satisfy industry's need to streamline their emission information reporting process. It was also noted that some industries either had their own software or were intending to develop software for maintaining this type of information for submission to AENV

For RAPIDS to be effective for use by AENV, it must be linked with other AENV systems and specific interfaces for information submission and access must be developed. Should RAPIDS not be adopted, these same standards must also apply to an alternate.

TABLE OF CONTENTS

SUMMARY I

1 PROJECT OVERVIEW 1

1.1 Objective of Project 1
1.2 Overview of Emission Inventory Status 1
1.3 Influencing Factors 2
1.4 Project Goals 2
1.4.1 Suitability as Emissions Estimation and Compliance Tool 3
1.4.2 Determine RAPIDS Software Usability 3
1.4.3 Suitability of RAPIDS for CEM Data 3
1.4.4 Set Standards for Electronic Data Transfer 4
1.5 Approach to Project 4

2 ASSESSMENT OF RAPIDS 5

2.1 Overview of RAPIDS 5
2.2 Suitability as an Emissions Estimator for AENV 6
2.2.1 Assessment of RAPIDS informational capability 6
2.2.2 Definition of AENV Requirements 8
2.2.3 Specific Applicability of RAPIDS for AENV 11
2.3 RAPIDS Usability 14
2.3.1 Workshop Example Description 15
2.3.2 RAPIDS – Usability Overview 16
2.3.3 RAPIDS – Ease of Use as an Emission Estimation Tool 16
2.3.4 RAPIDS – Ease of Use as a Compliance Data Submission Tool 17
2.3.5 Strengths of RAPIDS 17
2.3.6 Deficiencies in RAPIDS 18
2.3.7 Integration with Existing Industry Data Systems 19

3 MECHANISMS FOR ELECTRONIC DATA TRANSMISSION 20

3.1 Summary of Current Electronic Data Transfer Mechanisms 20
3.1.1 Summary of Data Transfer Mechanisms Currently Used by EMS 20
3.1.2 Summary of Industry Technical Environment Capability 21
3.1.3 Summary of RAPIDS Ability to Provide a Mechanism for Electronic Data Transmission 23
3.2 Identified Requirements 23
3.2.1 Reporting Specifications 24
3.2.2 Electronic Data Transmission Mechanisms 24
3.2.3 Encryption 25
3.2.4 Data Validation 25
3.2.5 Data Access 26
3.2.6 Data Confidentiality 26
3.3 Conceptual Architecture 27

4 NEXT STEPS 29

APPENDIX I: WORKSHOP MATERIALS A1

APPENDIX II: QUESTIONNAIRE AND CONSOLIDATED INDUSTRY FEEDBACK A2

LIST OF TABLES

Table 1 AENV Emission Inventory Data (Approved Industrial Operations)..... 10

LIST OF FIGURES

Figure 1 Workshop Example 15
Figure 2 Conceptual Architecture 28

1 PROJECT OVERVIEW

This project was initiated in response to the *Alberta RAPIDS Pilot Project* (October 1999) proposal that identified the need for an evaluation of an emission estimation system, and the requirement to define electronic data transfer mechanisms. This report identified the motivating factors and overall goals and objectives for this project.

1.1 Objective of Project

The Regional Air Pollutant Inventory Development System (RAPIDS) pilot project is to evaluate:

1. How Alberta Environment (AENV) can adapt and use an existing software package to store and manage air emissions information.
2. If Industry can use this software package to collect, and manage air emissions information.
3. How this information can be transferred between industry and government.

1.2 Overview of Emission Inventory Status

Alberta Environment's mission is to protect, enhance and sustain the environment through wise management. Some of the drivers for the Department's business plan include a desire for:

- increased public access to environmental information over the internet;
- Community Level Service and a one-window access to information;
- economic growth and expansion in Alberta guided by Legislation and policy framework that reflects modern approaches, including firm but fair enforcement mechanisms, and that is regularly reviewed and revised to ensure that they are effective and efficient; and
- shared services in recognition of the more effective and efficient service delivery that can be achieved in partnership with other Ministries and stakeholders.

One of the principles that guide Alberta Environment is to be leaders in innovation to improve the decision process that affects the management and protection of the environment. In response to these drivers and principles, a modern system for creating and maintaining an inventory of air emissions from regulated industries in Alberta is sought.

An emission inventory can be thought of as a comprehensive, accurate, and current accounting of air pollutant emissions and related information from sources within a given area over a specified time period. As well as emission data, a well-structured inventory will include source details and monitoring results, process and production information, pollution control equipment details, and

relevant compliance information that together allows the regulatory agency to determine the present and projected effects of emissions on air quality.

Emission Inventories are essential for:

- ensuring compliance with individual approvals (operating permits);
- addressing zonal/regional air management issues;
- determining the overall magnitude and trends of emissions;
- performing sector specific emission evaluations;
- addressing local air quality issues and problems; and
- fulfilling Domestic and International Obligations and developing provincial positions on these initiatives.

Emission Inventories are information intensive, requiring detailed knowledge of industrial processes, production levels and control technologies. They are best assembled through a collaborative effort that draws together information from people familiar with each specific source. Common methodologies for estimating emissions are critical so that results are comparable between facilities and between jurisdictions.

1.3 Influencing Factors

This pilot project is being carried out in conjunction with the update to the Air Monitoring Directive (AMD), with the intent to move from a paper to an electronic-based reporting system. As RAPIDS is primarily intended for emissions related information, this project will focus on that area. Similar efforts within the Environmental Service of Alberta Environment are focussing on ambient air quality and other information that is currently handled separately from air emission data. However, it should be kept in mind that RAPIDS is a flexible system that can handle other types of pollutant release and compliance related data. All this information needs to be linked into the Department's Environmental Management System (EMS) and one indicator of success depends on information being integrated with that system.

1.4 Project Goals

This pilot project should be seen as setting the foundation for a comprehensive emission inventory system. This is only the first step in a process that will likely take several years to fully implement, and should see ongoing improvement after that. The short-term inventory goals that this pilot project should address are outlined below.

1.4.1 Suitability as Emissions Estimation and Compliance Tool

Emission estimates must be timely and accurate. This project will assess the functionality of RAPIDS for estimating and storing emission data relevant to Alberta.

While originally designed for estimating air toxic emissions from various sources, RAPIDS has already been modified to store and estimate criteria and other pollutants. RAPIDS is geared toward industry and other emission sources in the United States, and it must be determined how well it can estimate Canadian (or Alberta) emissions. Some of the common problems include the differences between Canadian and American Standard Industrial Codes (SIC's), and differences in emission factors due to climate or basic process differences.

To be able to estimate emissions, basic data must first be entered into the system. How well available AENV compliance and emission inventory data fit into RAPIDS will have to be determined, and additional data identified that must be obtained. Given enough time and resources, it is certain that RAPIDS would work as an emission estimation tool. However, it must do so with resources that are available, or likely available. This pilot project then help to determine how comprehensive an inventory and compliance system can be developed, and in what time frame.

1.4.2 Determine RAPIDS Software Usability

Like any software, its suitability to the desired task can only be determined by using it. RAPIDS appears to have many features desirable for an emission inventory system for Alberta. It is easily available and well documented. It is already in use by other jurisdictions. Is it versatile enough to be used for Alberta industries? Is it customisable for Alberta political regions and airshed boundaries, and is it able to perform the required emission inventory functions?

RAPIDS is a complex piece of software for the novice emission inventory person. Although it could be used by government or industry personnel with little training, it would be mostly easily understood by someone with a sound knowledge of relational database design, emission inventory principles and jargon, and Windows™ file management. For this goal, questions such as "How easy is this software to use?", and "Who should use it?" will be answered. This project will determine the state of inventory compilation knowledge in Alberta, and the most suitable approach for proceeding.

1.4.3 Suitability of RAPIDS for CEM Data

The original project design for electronic submission of CEM data to AENV was detailed and comprehensive, and would require extensive resources to build and maintain. Although some gains are made by the use of an existing data management system (RAPIDS), it is not feasible to duplicate the complete design with limited resources. It is still desirable to improve the current data submission process, and this aspect of the pilot project should be viewed in this context.

The goal is to make some improvements in the efficiency of CEM data submission and collection, and have a "container" for long-term improvement.

1.4.4 Set Standards for Electronic Data Transfer

One of the drivers of this pilot project is the revision of the Air Monitoring Directive (AMD) by AENV. Should RAPIDS prove successful for use in Alberta, then its native file formats, or other compatible formats could establish a standard for information transfer.

If industry, AENV, and other partners all use RAPIDS, then the data links are simple. RAPIDS has the capability to export from one user's system to another, so the submission process can be very straightforward. If some users wish to retain their own data management system, or not use RAPIDS because of its complexity, than a standard data format can be derived. This would be a similar idea to the current process that the U.S. EPA if proposing for their National Emission Trends (NET) database. The States supplying the data to the EPA are not confined to using a particular data management system; in the future they will only need to supply the data in a predefined format. For Alberta, this format could be as simple as a text or spreadsheet file, or similar to the format that the EPA will be using.

The goal is to then set the long-term electronic data transfer standards for emission inventory and compliance related data.

1.5 Approach to Project

This project has been accomplished through a series of activities.

The information capabilities of RAPIDS are analysed and its applicability for use in Alberta assessed against the identified information requirements of Alberta Environment (AENV).

From this analysis, the essential information elements that industry must report to Alberta Environment for the emission inventory were identified and an example data set constructed which served as a basis for a training workshop.

Selected industry representatives were invited to attend the workshop where they were guided through the process of using RAPIDS to create and maintain the example data set.

Subsequent to the workshop a questionnaire was distributed to solicit participant feedback on the goals of this project, the perception of RAPIDS, and to obtain information towards identifying electronic data transmission (EDT) options.

The findings of the analysis, a compilation of participant feedback and suggested options for EDT are presented in this report.

2 ASSESSMENT OF RAPIDS

2.1 Overview of RAPIDS

RAPIDS is the principle component of the Great Lakes Regional Air Toxic Emissions Inventory project and the first ever multi-jurisdictional pollutant emissions inventory software to be developed. This software is an important product of the bi-national steering committee effort to design and implement a regional inventory containing sources of toxic air contaminants. The steering committee for the Great Lakes Regional Air Toxic Emissions Inventory project consists of members from the eight U.S. Great Lakes states, the province of Ontario, and the U.S. EPA, and observers from various other agencies in Canada and the U.S. The steering committee guides development of the regional inventory and associated products, including RAPIDS.

RAPIDS as an application possesses the following strengths:

- It is a mature and standardised application that was designed to ensure that a common approach and methodologies are used to generate emission information.
- It supports common reporting formats and standardised data input and output formats.
- It has an extensible data model capable of maintaining a broad base of pollution related information. RAPIDS can store and manage any type of monitoring information (air, water, or waste discharge), and process or product monitoring. The model is based on conventional rather than regulatory principles and hence is applicable to both government agencies and private industry.
- It can and does serve as a common resource between jurisdictions. This ensures a common and compatible information base and common support mechanisms.
- It is supported through agreement by GLC with ongoing development sponsored by the GLC and other agencies.
- It has a client server architecture and can be hosted on an Oracle database

RAPIDS has been identified to have the following weaknesses:

- It has a complex user interface. This is a by-product of the complexity of the underlying data sets required to construct an emissions inventory.
- Its extensible data model does not enforce rigorous rules to ensure that a complete and consistent base of information is created. Consequently utility functions such as emissions estimation will fail if the data sets are not constructed properly. And hence, the user must undergo a steep learning curve before RAPIDS can be used effectively. RAPIDS does provide a consistency checker to assist with validating data sets.
- The data model does force the description of emissions information into a hierarchy of geographic, source, device, process, stream, emission and legal components. Measured and/or estimated values are linked to specific components of this hierarchy, and should the description of a facility change due to ongoing modification measured and/or estimated values can become disconnected from its source. In addition, the emissions estimator routines do not utilise process schedule information, and it is not possible to indicate a

process change in a facility without impacting the ability to estimate emissions associated with the prior process.

- It uses a select base of standardised methodologies to estimate emissions. These include source emission estimation based on SCC and AMS emission factors, and also now mobile source emission estimation based on Mobile 5C. It does not currently support, for example, emissions estimation for evaporative loss from fuel storage tanks. This information would need to be calculated externally by an algorithm such as the US EPA TANKS model and the resulting emission values input into RAPIDS.
- Source Classification follows the U.S. Standard Industrial Codes (SIC), these are not compatible with the Canadian SIC. Furthermore when RAPIDS is upgraded to support North American Industry Classification System (NAICS) these codes may be developed inconsistently between U.S. and Canada.
- It has a Powerbase interface, and ODBC drivers, which precludes integrating its interfaces within a framework based on Oracle and Oracle Forms.

RAPIDS provides the following opportunities to Alberta Environment:

- Because RAPIDS and its variants are employed by several different agencies there is a potential to create a common agency application that pools resources for development and support.
- Its common and extensible data model can form an information backbone from which all agencies and industry can link data sets.

The following risks are associated with RAPIDS:

- Information in RAPIDS must be linked with information in EMS and other Alberta Environment information systems. As such, RAPIDS must be considered a component of a greater system, and there are risks associated with integrating such disparate information systems.
- These risks are compounded when RAPIDS is supported by and evolves in function under the direction of the GLC. It is possible that RAPIDS may become divergent in function from that required by Alberta Environment, leading to a variant of RAPIDS for Alberta that would require specific support by AENV.

2.2 Suitability as an Emissions Estimator for AENV

2.2.1 Assessment of RAPIDS informational capability

RAPIDS' great strength is derived from the fact that it was developed to co-ordinate the emission inventories of several jurisdictions that surround the Great Lakes. Consequently its information sets are generalised to support common methodologies, and common summary reports. The data model provides maximum flexibility in the types and volume of data that can be stored.

Flexibility: The RAPIDS data model is object-oriented and modular. For certain applications, such as emissions inventory development, only certain entities and relationships may be required. As other needs develop, additional entities and relationships can be incorporated without the need to redesign the entire data model.

At the same time, information is arranged around a core of seven data modules. These modules provide a base description of emission sources that serves as a framework on which emission values are constructed and managed. There is a straightforward linkage between reported emission values, and their associated base quantities and the corresponding process and control technologies. It must be noted that any changes to the base description can not be achieved without affecting the associated emission values.

RAPIDS Data Modules: RAPIDS organises its information according to a hierarchy of seven Data Modules.

Geographic: which defines nations, states, counties, and cities and their relationships. In addition, nation groups, state groups, county groups, and city groups can be created for logical associations of these geographic entities.

Source: which defines facilities, area or mobile sources. Industry and Area/Mobile Source codes can be associated with each source. Sources can also have defined geographic location coordinates and contacts. Source groups can be constructed to create a logical grouping of facilities or a grouping of area and/or mobile sources.

Device: which defines devices for a source. A source can have any number of devices. Devices include equipment such as boilers, as well as control devices and stacks. Devices can also have location coordinates, contacts, and be grouped. The connections between devices can be identified to identify paths for material flow between devices.

Process: which defines processes for a device. Devices can have any number of processes. Processes that create emissions as well as processes that control emissions can be described in RAPIDS. Processes can be grouped within a source to represent operating scenarios or other logical associations.

Stream: which defines the material flow in and out of processes. A stream provides a logical grouping for materials that share common paths between processes. The stream can indicate an originating flow of external material into a process or a flow of material from a process to the environment. Streams can link processes within a device or can link processes that reside in separate devices (that have been identified as 'connected').

Emission Estimation: which defines the SCC/AMS codes, SCC/AMS to Emittant relationship, Emission Factors, Speciation and Product Profiles, and Calculation Protocol. The data within this module drive the emission estimation algorithms.

Legal: which defines the legal relationships concerning a facility.

Certain categories of useful information are common to many of the seven data modules:

Groups: database record groups can be created within each data module. Groups are useful when information is ascribed to a collection of sources (through an area summary) or several processes (such as fugitive loss).

Activity Data: show activity data within the geographic, source, device, process, stream, and legal modules. For example emission values of various contaminants are maintained as stream activity values within RAPIDS. However only specific types of 'Activity Data' are recognised by the RAPIDS Estimator, Reporting, and Data Import/Export facilities.

Location Coordinates: can be defined within the geographic, source, and device modules. Hence the spatial arrangement of a facility can be defined within RAPIDS.

Contacts: can be defined within the source, device, and legal modules.

2.2.2 Definition of AENV Requirements

The current base of information that is currently available for AENV to create an emissions inventory suffers from the following deficiencies:

- The available emission information is inconsistent between industry sectors, resulting in difficulties in compiling pollutant summaries.
- Base quantity information is not reported with emission values, leading to potential double counting problems when quantifying emissions based on gross fuel usage.
- Emission values are not accompanied by supporting information leading to problems with verification.
- Emission values are not easily shared between agencies because a common coding system has not been adopted.

To overcome these deficiencies, and to be able to manage the Emission Inventory for AENV, the system must satisfy the following requirements.

Common Definitions and Standardised Methodologies
The inventory system must provide mechanisms to overcome inconsistencies by providing common definitions and standardised methodologies for estimating and reporting information.

Linkage of Emission Information with Supporting Information
The inventory system must provide straightforward linkages between reported emission values and their associated base quantities and corresponding process and control technologies.

Standardised Coding Mechanisms
Standardised coding mechanisms must be employed so that information can be reported in terms of industry sector, process technology, geographic area, and emission type (point, area, mobile).

Multi-Year Capability
The emission inventory system must support multiple years of data, and must provide the ability to back cast and forecast information sets.

Ability to Manage CEM Data
CEM data can form an intrinsic base to an emission inventory system. It qualifies the emission totals, and emission estimates provided by an emission inventory. Conversely, the supporting information on processes and base quantities in an emissions inventory, can assist in qualifying CEM data. Hence a system that integrates CEM data with emission inventory information is desirable.

Centralisation of Information
To reduce redundancies and inconsistency of information, the emission inventory system must be centralised. The information must be accessible, but also secured by assigned levels of privilege. The system must support electronic data transfer from and to industry, and from and to other agencies.

Compatibility with other AENV Systems
The information sets contained within the emission inventory system must be linked with information contained within other Alberta Environment systems, specifically the Alberta Environment Management System (EMS).

> The EMS system is designed to manage most aspects of environmental information management regarding approvals, licenses and other regulatory and related information. For air emission information, the EMS system is only capable of storing limited information regarding industrial processes and the locations that the processes are being performed at. EMS has no capability for managing information about specific devices used for environmental monitoring.

Specific Information Requirements

Table 1 identifies specific information that must be maintained by the emission inventory system.

Table 1 AENV Emission Inventory Data (Approved Industrial Operations)

General Description of Information	Details	Comments
	1988 AMD	
Inventory of Sulphur Emissions	• Includes H_2S and SO_2 by release point • Method of calculation to be noted • 10 t/yr cutoff for reporting	Produced reasonably complete annual inventory for SO_2. Point sources not well defined. Data copied to spreadsheet.
Inventory of Oxides of Nitrogen Emissions	• Includes NO_x emissions by facility • Method of calculation to be noted, but chosen method left up to Operator • 10 t/yr cutoff for reporting	No information available to support emission estimates, unless a continuous emission monitor attached to source. Unable to discern individual points within a given facility.
Manual Stack Surveys	• as required by Approval • provides "spot" check on emissions and possible emission factor	Requires production information to be of use for emission estimates
CEM Data	• complete estimate for source and pollutant being monitored • generally available for major sources of SO_2 and NO_x emissions	Reliable source of information but does not provide good coverage for all industry sectors and pollutants.
Production Data	• as required in individual Approvals • for stated processes only, may not provide picture of entire facility operation	Data is sporadic and generally not complete to fully estimate emissions.
	Proposed AMD Update 1999	
Facility Information	• Identifiers for operation, including approval number, location by Lat/Long or UTM, airshed, contact information, other Regulatory Ids (AEUB, NPRI) • SIC (NAISC)	Basic identification information so that a complete listing can be determined. SIC codes necessary to group by industry and for comparison to StatsCan data.
Process Information	• Identification of individual processes at facility, by Source Classification Code (SCC) • Production and/or fuel usage for each process • Pollution control equipment for each process • Temporal allocation of activity • Stack surveys, CEM, mass balances, other estimates tied to each process • Identification of assumptions, comments	SCC must be identified to use production and emission factors. Data required for QA/QC, comparison to other facilities and provinces, reconciliation with area sources (StatsCan data, AEUB data, other). Identification of Process and activity allows "for first cut" estimate of many pollutants not directly measured, including air toxics, GHG's, criteria pollutants
Point Level Data	• Identification (ID and location) of each source meeting a release criteria • Lat/long or UTM coordinates • Stack parameters for Dispersion modelling	Used for approval, EIA, and regional modelling. Also required to ensure emissions is complete for facility.
Area Sources	• Identification of releases not covered under point sources • Fugitive release at facility • Cooling ponds • Tank farms, etc	Data can be estimated from Emission Factors, source surveys and activity level, other facility operations, engineering estimates, LDAR, Industry association reports.

2.2.3 *Specific Applicability of RAPIDS for AENV*

Common Definitions and Standardised Methodologies
RAPIDS information structure is extremely flexible as to the types of information that it can manage. However, RAPIDS is pre-populated with a base of common Standard Industrial Codes, Source Code Classifications, Generic Emission Factors, Methods of Estimation, Methods of Measure, Units of Measure, etc. This base of common information is provided to RAPIDS users by the GLC, and can ensure compatibility of information sets.

This base of common information follows U.S. standards and can be altered to match Canadian and Alberta requirements. Altering this base of common information can make derived information incompatible with U.S. Inventory information. Generating the base of common information is a significant task currently undertaken only by the GLC, and any alterations must be consistently reapplied as the base information is updated. Consequently adjusting the base definitions and methodologies of RAPIDS will increase the ongoing information maintenance demands.

Linkage of Emission Information with Supporting Information
RAPIDS provides the ability to describe facilities and the associated processes which lead to and allow the control of emissions. This facility description provides a framework from which emission information and base quantity information is recorded. Thus, RAPIDS implicitly links emission information with its qualifying information. This is both a strength and a liability. Should the underlying facility description be altered due to plant upgrades, historical emission information can become disconnected from the facility description.

Standardised Coding Mechanisms
RAPIDS can associate Geographic Areas, Industrial Codes (SIC) and Source Codes (SCC/AMS) with emission information. These codes form the basis of several reports in RAPIDS and are used to select information within RAPIDS. These codes are part of the base information sets that are provided by the GLC for users of RAPIDS. These codes are U.S. based codes and do not in all cases correspond to Canadian equivalents. As noted in the prior paragraphs on 'Standard Definitions and Methodologies' the base information sets can be tailored to conform to Canadian requirements. This creates an ongoing maintenance demand as the base information sets are upgraded.

Multi-Year Capability
RAPIDS maintains emission information around a base description of geographic area, source, device, processes and stream configuration. As long as there are no changes to the configuration, RAPIDS can maintain data sets that span arbitrary periods of time: Under these circumstances RAPIDS can manage multiple years of data. Should a component of a facility change, however, such as the replacement of a device, the change of a process, or the redirection of a stream, the base of emission information will also be altered. In some causes the emissions estimator will be unable to re-create previous emission estimates.

Ability to Manage CEM Data
RAPIDS is not capable of storing continuous stream CEM data. RAPIDS is capable of managing monthly CEM summary information. However for this information to be effectively

linked with base quantities and emission estimates the monthly CEM summaries must provide emission totals.

Centralisation of Information
RAPIDS can be deployed in a client-server architecture where central database maintains information for all users. Access privileges can be controlled through user accounts, and while the default RAPIDS installation does not provide selective security restrictions, RAPIDS uses an Oracle database which can be customised to restrict access to specific sets of data as required. This customisation would represent an ongoing maintenance issue should RAPIDS be upgraded and its data structures revised.

Data Mapping between RAPIDS and EMS
Some changes are necessary to accommodate data mapping between EMS and RAPIDS. EMS does not contain the same level of detailed information regarding devices and processes that Rapids does, and the location information in EMS is structured differently than similar information in RAPIDS. RAPIDS does not maintain the same level of regulatory information as EMS.

To map data between the two systems, it is likely that fields will need to be introduced or modified in one or both systems in order to map records from one system to the other. Neither system should require drastic change to accommodate the mappings, however some data structures will need to be modified, as well as affected application modules and batch processes.

Specific Information Structures of RAPIDS
The RAPIDS system is designed to maintain large volumes of air emission information and can also maintain detailed information regarding devices, locations of devices and device processes. The RAPIDS information structure meets most needs for managing air emission information as well as some of the information required for regulatory approvals and related licenses.

Facility Information:
RAPIDS provides the ability to define the following information for a given source.

- Source Type (Facility/Area/Mobile).
- Date originated, Date terminated.
- Location – Address plus Area Categorisation (Nation, Province/State, County, City).
- Contact information.
- Industry Sector Coding (these are currently US SICs but are to be upgraded to provide NAICS coding).
- Location coordinates.
- Source Grouping

Additional information can be included as 'Activity Data' associated with the source. RAPIDS can include the Canadian SIC codes and other Regulatory Ids (AEUB, NPRI) as additional activity data. Consequently RAPIDS can maintain the required base of facility information for AENV as identified in section 3.2.1.

However this information may not be utilised in any of the standard RAPIDS reporting modules. RAPIDS uses US Standard Industrial Classification (SIC) codes to categorise sources. These codes are ingrained within the base of information that RAPIDS uses to identify device types and process metrics and may not be easily replaceable by Canadian Equivalents, furthermore summary reports in RAPIDS which utilise SIC grouping will not be appropriate for Canada.

On a positive note, because every source in RAPIDS is identified by a selectable source code there is an ability to pick codes that are cross referenced to facility specific codes in the Alberta EMS. This provides the potential to allow facility information in RAPIDS to be dovetailed with information in other AENV systems.

Device Information:
The different physical components of a facility are described in RAPIDS as devices. RAPIDS can be used to identify the following information:

- Installation date, and dismantling date of each device.
- The device type (Stack, Boiler, Scrubber, etc).
- A specific SIC code that can be associated with the device.
- The operator contact.
- The connections between devices for material flow. And,
- Physical groupings of devices that share common information.

Additional information such as stack height and diameter can be included as 'Activity Data' associated with the device. RAPIDS can include the Canadian SIC codes and other Regulatory Ids (AEUB, NPRI) as additional activity data.

RAPIDS allows each device to be identified by a user selectable code. This provides the potential to link device information in RAPIDS with compliance information held in other AENV systems.

Process Information:
RAPIDS allows the following information to be recorded to describe processes:

- Process Type
- Mode of Operation (Startup, Shutdown, Normal, etc...)
- Operating Schedule
- Source Code Classification (SCC) or Area Mobile Source (AMS) code.
- Process Groupings

RAPIDS can maintain information on emission processes and control device processes, to qualify emission values reported to AENV. The process description provides the base from which emission factors are selected or ascribed.

Stream Information:
The flows of materials into and from processes are associated with streams, the quantities of material flow are identified as 'Activity Data' associated with a stream.

Stream Activity Data:
Information on base quantities as well as measured and estimated emission values can be maintained in RAPIDS as 'Activity Data' associated with a stream. This type of information can include qualifying information such as:

- Time Period
- Metric, Material Code and Unit of Measure
- Indication of accuracy and method of derivation/measurement
- Confidentiality Indicator
- Reference Code to distinguish data sets.

RAPIDS uses 'Smart Metrics' to identify specific types of activity measures appropriate to stream. The material codes, methods of measure/derivation, and the units can be defined as required. RAPIDS will automatically convert units of measure in calculations or reports.

RAPIDS can potentially hold Stack Survey and CEM data as stream activity data. However RAPIDS is not designed to handle large volumes of sequential time series data, and hence should not be used to hold individual CEM values.

Emission Estimation:
RAPIDS contains a base of generic emission factors from the U.S. EPA Factor Information Retrieval (FIRE) system, and from the U.S. EPA SPECIATE system that can be used to calculate emission values from base quantity information or total particulate (PM) or total organic gas (TOG) aggregates. Should a suitable generic factor not be suitable, RAPIDS provides the ability to define factors for geographic areas, specific sources, devices, or even processes.

Quality Assurance:
RAPIDS provides a data consistency checker and a statistical analysis checker.
The consistency checker examines the data sets to determine if the data is complete. The statistical analysis checker is useful for determining outlier values and statistical variation of emission values.

Summary Reports:
RAPIDS provides rollup summaries which identify emission totals by Industry Sector (SIC codes), Geographic Area, and Industrial Process (SCC/AMS).

2.3 RAPIDS Usability

RAPIDS usability was evaluated through a workshop where representatives from industry were guided through an exercise in which involved inputting a data set and estimating emissions. The data set involved typifies the type of data appropriate to an emissions inventory that industry is required to report to AENV.

The example is based on a fictitious coal burning facility. The exercise involved describing the facility which sufficient information to identify the stack and main device and the emission

process. The base quantity consumed in the emission process is defined, and the emissions derived through the emissions estimator.

Feedback on the workshop was obtained via a questionnaire, the results of which are presented in Appendix A of this document.

2.3.1 Workshop Example Description

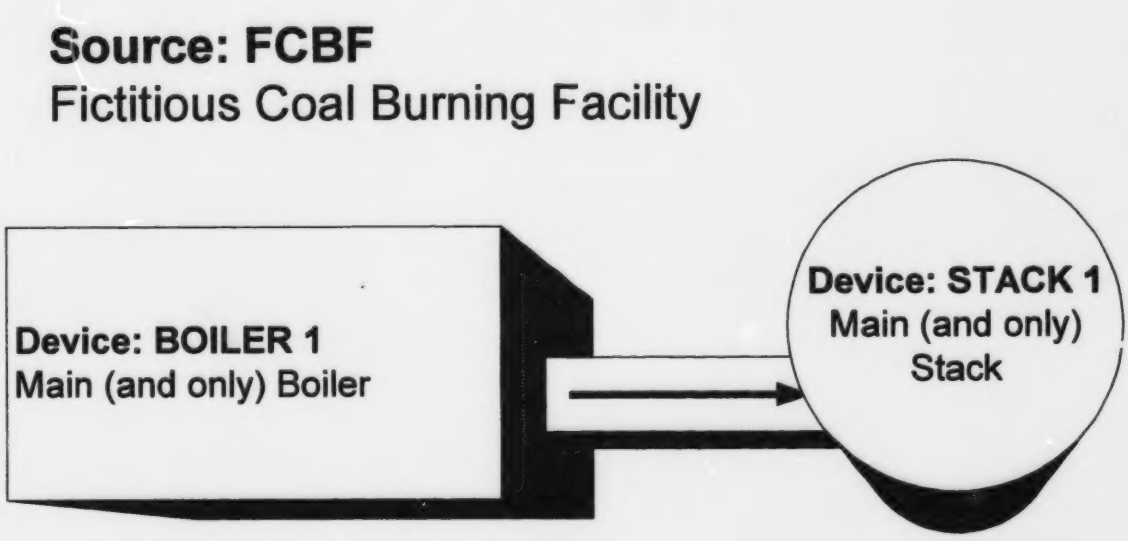


Figure 1 Workshop Example

In the device '**BOILER 1**' coal is combusted at atmospheric pressure to generate electricity. This facility has an SIC of 4911. This process is identified as '**BURN 1**', and involves coal combustion in an atmospheric pressure boiler for electricity generation using a travelling grate stoker. Thus the process has a SCC of 10100102. Over the course of the year 1999, 15,000 Metric Tonnes of Coal are consumed.

BOILER 1 is connected to **STACK 1** where the process of discharging to the atmosphere is identified as '**EMIT 1**'.

2.3.2 RAPIDS – Usability Overview

During the workshop, RAPIDS was presented as a tool for industry to install and use at their sites. With local versions installed and linked to a central repository, there could be an efficient and secure link between industry and Alberta Environment for data sharing. In the subsequent questionnaire, this idea was discussed, along with other alternatives for data sharing.

Comments and impressions from the pilot project group on the RAPIDS interface and system were mixed. The responses ranged from seeing potential in using RAPIDS to not seeing any usefulness at all. It became apparent that many of the respondents already have their own data management systems and methodologies in place, and for them to also use RAPIDS would become a burden.

> It is also apparent that a variety of methodologies may be used to estimate emissions, leading to potential inconsistencies in reported information.

RAPIDS is a complex tool that is able to handle not only a significant number of emission sources, but varied types as well. This ability to account for types of emission sources ranging from simple combustion point sources to fugitive area sources and mobile sources incurs a steeper learning curve. If RAPIDS were a tool focused on one industry, or for emissions only from mobile sources, the user interface and understanding of the data input requirements would appear simpler as they could be geared specifically to individual user requirements. A broader reaching system and interface such as RAPIDS presents more options and consequently places more demands on the user. In addition, a more generic nomenclature for processes, activities, and emission sources is thrust upon the user.

For perspective, matching a system to a required user environment either leads to the creation of more systems or the creation of more interfaces on a given system. In the case of an emission inventory, each interface would only have the capability to handle a specific type of emission source, such as a gas plant. The interfaces could be designed much simpler for the user to understand as only features and components necessary for that type of facility would be incorporated.

The following sections reflect the comments made during the workshop, the responses to the questionnaire, and summarize the findings of the pilot project organizers.

2.3.3 RAPIDS – Ease of Use as an Emission Estimation Tool

A review of test data obtained from the Great Lakes Commission demonstrated that a wide variety of emission sources could be handled. RAPIDS follows the general practice of identifying: type of industry, type of process, amount of activity associated with each process, the estimation of emissions for each process based on the best available technique, and the amount of emissions that are removed before being emitted to the environment. RAPIDS requires that all of the identified elements be identified and linked as they are in reality. Although other systems also require this, this aspect is more extensive in RAPIDS. This

comprehensive linking of elements adds an element of data quality control, in that no information or data can be entered without it being properly linked. However, this aspect proved initially frustrating. During testing of RAPIDS, it was found that data elements must be entered in a very specific order.

RAPIDS proved to be able to store measured emission values and produce estimated emission for a wide variety of pollutants. For a given facility, process, and activity, RAPIDS could store pollutant emissions as measured by a manual stack survey. It could also make estimates for pollutants not directly measured, based on this same information.

2.3.4 RAPIDS – Ease of Use as a Compliance Data Submission Tool

Compliance data is typically defined as information that must be submitted from an operator to Alberta Environment, as stipulated in the operating approval, or as required through a directive such as the Air Monitoring Directive (AMD). There is considerable overlap between what is generally thought of as "compliance data" and "emissions data". Compliance data is often more concerned with the information for a given point in time, such as an hourly maximum emission rate. Emission data, or the "inventory", is the rollup of all hourly emission values into an annual estimate of the amount of pollutant released into the environment. Some of this rollup or estimation is often performed outside the compliance data submission process.

From the outset, it was made clear that RAPIDS could not handle ambient monitoring data, and it had poor capabilities for managing extensive "text" information. However, compliance information such as stack temperatures, opacity measures, production data, and other monthly or annually summarised CEM data could be managed by RAPIDS. If the linking of all physical elements at a given facility was properly accomplished, each of these elements could be logically linked to the device that it occurs at.

As many of the industry respondents noted that they already have their own systems in place for managing "compliance" data, the consensus was that RAPIDS would not make as a good a tool for submitting compliance data as it would for emission data. Not only were they more familiar with their own systems, but requiring RAPIDS to be used would be a duplication of effort.

2.3.5 Strengths of RAPIDS

Although many of the participants in the pilot project found the RAPIDS user interface complicated and difficult to navigate, this was based on a one-day introduction. One of the participants found that RAPIDS was no more complicated than any other system for collecting data. However, it should be noted that the participants considered themselves to be generally more proficient than average in using a personal computer and software. This might not be the case for all industry personnel whose responsibility it is to submit data to Alberta Environment.

Leading up to the workshop, LGS and Alberta Environment project staff each spent from 5 to 10 working days obtaining RAPIDS, installing it as a local database, and learning how to use the basic features of the system. This time did not allow for one to become fully proficient in use of

the system. However, it did allow for the staff to enter example facilities, processes and activity data, run the emission estimator and some simple reports. This confirmed functionality for AENV requirements.

In comparison to a popular desktop relational database such as Microsoft Access™, the learning time is to get to a working level is similar. For someone that would be responsible for the overall construction of an emission inventory, this amount of time would be considered reasonable. From the perspective of someone that would manage a data repository of emission information, being able to obtain and use such a system in the noted timespan would be a definite strength. When coupled with the ability of RAPIDS to estimate and store emissions for a wide variety of sources, this is a definite asset.

2.3.6 Deficiencies in RAPIDS

Because RAPIDS was designed to be a flexible database and handle large amounts of data, the system is too complex for the casual user. This was noted during the workshop by several participants. In fact, for some industrial operators not present at the workshop, the system and interface would likely appear excessively complex. Even in the current paper reporting system within Alberta Environment, some operators do not have significant monthly or annual reporting requirements. Their monthly data submissions for source or emission data are captured on one or two pages of paper.

In two of the U.S. States that employ RAPIDS as their emission inventory system (Michigan and Ohio), a different interface program is sent out to the industrial facility operators. This is done for several reasons, one of them is the complexity of the RAPIDS interface to the more casual user. In these states, an annual emission inventory statement is required, so the software would only be employed once a year.

For the workshop participants that expressed interest in working further with RAPIDS as their own facility emission management system, a deficiency relating to the incompatibility of various Canadian emission inventories was noted. RAPIDS has the capability to estimate emissions of the criteria pollutants (SO_2, NO_x, CO, PM, and VOC's), various air toxics, and greenhouse gases (CO_2 and methane). Many industrial operators in Canada submit data to a number of regulated and voluntary programs, including the National Criteria Air Contaminant Inventory, NPRI and ARET (air toxics and other pollutants), and the VCR (greenhouse gases). Although RAPIDS could conceivably estimate all these emissions, it does not have the export capability to send data in the required format for all of these programs. However, RAPIDS could enhance this process, as these other programs either do not have reporting software or standards, or they only have "reporting" software (not estimating software). In addition, some of these programs have additional fields that RAPIDS could not directly handle in its current form.

Another apparent deficiency of RAPIDS is that it was not originally designed to be used for submitting "compliance" data. Although the flexibility of the system would allow for it, there are two issues to be resolved. One is that much of this compliance data comes from other electronic data systems that may not be directly compatible with RAPIDS. This would require that the data be transferred manually, or that translation programs be written for each industry

user. The other issue that should be further addressed is the quantity of the data that could be produced and submitted to Alberta Environment. In the current paper system, it is a necessity that only extreme data values (ones in excess of approval limits) and summaries are submitted. However, it has long been the desire that for some elements, such as CEM data, a complete data set be submitted. The number of data points in this kind of set would be significant, and could overload both the RAPIDS interface.

2.3.7 Integration with Existing Industry Data Systems

Two things became very apparent during the pilot project:

- That some industry operators already have their own system in place for managing data, and that
- They all agreed with the need for an efficient electronic data transfer system.

In fact, for submitting data as required by the Air Monitoring Directive, it is almost standard practice for industry to print hard copies of the data from their electronic systems for submission to Alberta Environment. The logical improvement would be the direct transfer of this data from the industry's electronic data systems to one at Alberta Environment. During the workshop and through the responses to the questionnaire, it became evident that the RAPIDS interface, or even any single mandated interface, would be not be suitable to this task.

Industry is not concerned with the ultimate data repository (ie RAPIDS) that Alberta Environment may use, they are concerned with:

- Only submitting data that is required to manage the environment,
- Submitting this data in an orderly and efficient fashion,
- Having access to compiled (non confidential) versions of this data, and
- Looking for links (efficiencies) with other programs that they have to submit data to.

The solution to integrating the various data management systems in use by industry and various governments will not mean gravitating towards a single database or management system. The solution will be in determining the elements that are common between them, and setting out standards for the transfer of this common data. This idea of data mapping is further explored in the next section.

3 MECHANISMS FOR ELECTRONIC DATA TRANSMISSION

3.1 Summary of Current Electronic Data Transfer Mechanisms

3.1.1 Summary of Data Transfer Mechanisms Currently Used by EMS

EMS currently uses FTP as a data transfer mechanism for data transfer from outside parties to Alberta Environment. The Water Data System (WDS) portion of the EMS application is using this mechanism for transfer of water quality information from independent laboratories to the EMS application.

The transfer mechanism is set up such that each laboratory has access to their own FTP account on a publicly available FTP server located at Alberta Environment. When a lab has data to report, they prepare a data file and use an FTP client program to login to their account and transfer the file to the Alberta Environment FTP server.

The data file is a flat ASCII file and is laid out in a standard data format, specially designed for reporting water quality data. There is some error checking information included in the file, and the file essentially contains sample and measurement information using the Federal Government standard VMV codes.

When data arrives on the FTP server from a lab, it is stored on the FTP server until a batch process picks it up and transfers it to a staging machine inside Alberta Environment's firewall. This process is invoked by the staging server and occurs on a regular schedule, typically every four hours.

Files transferred to the staging server are subject to an initial assessment by the WDS users and if they appear to be physically correct, they are then loaded into the EMS database. Files with obvious problems such as missing or malformed data is immediately rejected without being loaded to EMS. In such a case, the lab is usually responsible for re-submitting the data. Contact to the lab is usually done via phone or email by the WDS staff since there is no automatic mechanism to inform a lab of a data load failure.

Data that appears physically correct is loaded into a set of tables in the EMS database. These tables are known as the WDS "temp" tables, and this is where the WDS users perform second-level validation on the data. This is typically done visually, or using spreadsheets and other tools to ensure correctness of the data.

Data that is deemed to be valid is moved to the "main" set of tables by the WDS users where it is then available to most other EMS users. Data that is found to contain errors or omissions is rejected during the validation process, and the lab is typically required to resubmit the data after correction.

This process has been in place for three years, and is currently meeting the needs of the WDS staff. The process was put in place when the WDS sub-system was commissioned as part of the EMS system. This process replaced the paper-based system previously used to enter water quality data into the mainframe that ran the old NAQUADAT system.

3.1.2 Summary of Industry Technical Environment Capability

Emission Monitoring Technology

All representatives of industry reported that they are required to report stack emissions. To record these emissions, all use data loggers of one type or another. These data loggers include various models from:

- Bovar
- Bailey
- USI
- others

The information systems in place to handle data from the loggers include:

- PI
- EDAS
- Honeywell PHD
- CPC

as well as proprietary systems based on a variety of technologies.

Most respondents report that staff is available specifically for supporting monitoring systems.

Computer Systems Technology

The technical environment for IT in place at most industry sites is generally as follows:

- Support staff for managing the computing infrastructure
- Intel Pentium based microcomputers as staff workstations
- Microsoft Office suite of applications
- TCP/IP networking
- Internet connections

Operating systems in use include Windows NT/9x and Windows 2000. Also, at least one company is using Novell. Also in use are systems such as VAX, Honeywell and other industrial computer operating systems.

Software applications are available on the networks, or are loaded locally on the user's workstation. Most respondents report that both deployment schemes are in use on their sites.

Database technology includes Microsoft Access, Oracle, SQL Server, Sybase as well as some others. Nearly all respondents indicate that Access is available and most also have Oracle available. Database connectivity protocols in use include ODBC and SQL*Net where Oracle is being used.

Internet Technology

Most respondents report the Internet connections are available to their staff.

Connections to the Internet vary from high-speed T1 lines to slow dial-up connections. Generally, the larger sites have faster and more reliable connections, while the remote sites are usually limited to a dial-up connection.

All respondents are using firewalls to protect their internal networks. Users accessing the Internet through a direct dialup connection are normally not restricted, as their connection would not go through the corporate firewall.

Restrictions on Internet usage vary from virtually no restrictions to heavily restricted access. Generally, users are free to browse the web and send and receive email, however FTP and other protocols may be subject to restrictions.

Email is used by every organisation, and is not normally subject to restrictions regarding the sites where mail is being exchanged. The restrictions that are in use are limits attachment sizes. Many sites scan for viruses on attachments and one of the site's reports that this may cause an overnight delay in mail transfer when it is implemented, and one company can not send or receive attachments within Email.

The restriction placed on web browsing typically involves blocking access to certain sites. Both Microsoft's IE browser and Netscape are in use, although IE is predominant.

FTP is the most restricted of the commonly used protocols. Control of FTP usage ranges from no control at all to complete blockage of all FTP traffic. In regards to using FTP for submitting data all sites but one report that they can do it, although special permission may need to be obtained for some sites.

Technical Environment Summary

Given the current trend in computing technology, it is not surprising to see that all industry participants are using Intel Pentium based microcomputer hardware running some form of Microsoft Windows. Also, the level of Internet usage and related restrictions on its use follow the patterns now seen in other industries and governmental organisations.

For the purposes of reporting air emissions information, all participants in the survey appear to be fully capable to supporting electronic data transfer. It should also be noted that all but one of the survey respondents represented a fairly large company or organisation. The one exception was a spokesman from the Forestry sector who expressed concerns about the technical capabilities of the smaller companies.

Once again, given the current technical trends, it should be safe to assume that nearly all of the smaller organisations can support basic computing technologies such as Intel microcomputers, Windows and dial-up Internet connections.

However, it would not be safe to assume that firewalls, Oracle and even Microsoft Access are available in the smaller outfits. Use of the web, email and FTP may not be immediately available everywhere, however these are now generic computing technologies that should not prove too difficult to adopt for most, if not all organisations required to report air emissions.

3.1.3 Summary of RAPIDS Ability to Provide a Mechanism for Electronic Data Transmission

RAPIDS can serve as a mechanism for electronic transmission of emission inventory information. RAPIDS can be deployed as a client-server application where industry and government share a common information server, or information can be collected and maintained in separate RAPIDS databases and the RAPIDS import/export data facility can be used to generate files for electronic data transmission.

It must be noted, that RAPIDS system does not provide a mechanism for transfer of all data as required by AENV from industries which are required to report air emissions information.

In order to use RAPIDS as part of an integrated electronic data transmission facility, several changes are required. Specifically, data interchange specifications need to be drafted and processes to manage transmitted data need to be designed and built.

3.2 Identified Requirements

Ideally, an electronic data transmission system for air emission reporting should support all information needs and should also be compatible with the computer technology currently in use. Also, any security requirements on the data must be met and means communicating with the data submitters, governmental regulators and other interested parties should be incorporated.

Other aspects of such a system include usability, maintainability and flexibility. These factors play a great part in the eventual success of any computing system and should be kept in mind when such a system is being designed.

3.2.1 Reporting Specifications

The exact data requirements must be defined. It is necessary to determine exactly what data is to be reported and to what agencies.

A standard data specification should be designed that uses ASCII text and can handle all of the required information. The format should be flexible enough to handle all variety is data being reported and should include information about the submitter, error checking information, date and time stamps and other technical information as required.

A data loader will need to be built to import the submitted data into a staging area where both human and machine can look at it before it goes to the repository. The loader should perform as much validation as possible automatically.

By using ASCII text that conforms to the defined data specifications, all organisations involved should be able to physically handle the data files. The largest problem may be handling the various formats used by the actual data loggers. To accommodate a single data submission specification, it is likely that conversion software needs to be written for each model or family of logger. This should not pose difficulty for the larger organisations, as their systems typically already have this capability, however the smaller firms may not be capable of developing such software on their own.

It should also be noted that all survey respondents indicated a preference for submitting via spreadsheets. Despite the indicated preference for spreadsheets, these should not be adopted as a form of submission. Experience has shown that spreadsheet data formats can change without notice and these changes are outside the control of the involved organisations. It has also been found that spreadsheets that look identical can in fact be internally formatted quite differently even when generated by the same software package and the same user. This fact makes it nearly impossible to write a reliable loader for spreadsheet formatted data.

3.2.2 Electronic Data Transmission Mechanisms

To actually transfer the data one of the following, if not all three, should be provided:

- FTP file transfer
- Email
- Web upload

Each of these can be implemented using current technology, and by offering more than one submission alternative, all submitters should be able to transfer their data.

FTP should be supported, as it is ideal for automated batch transfers. Most of the larger organisations with high volume reporting requirements should be able to utilise FTP to automate their transfers.

Web uploads should also be supported for the smaller organisations and for remote sites reporting through dial-up lines. Since there are few restrictions on web access, this method should be available to virtually all submitters. Web uploads also have the advantage of potentially processing the data when it arrives and reporting its results back to the user immediately.

Data files could be emailed directly within the body of an email message, or the data files could be "attached" to the message. Due to security issues around mail attachments, this alternative may not prove practical to implement. Data files transmitted in the body of an email message can also prove problematic due to delays in transmission, mail text formatting issues and technical issues around sending and receiving mail automatically.

Although email has proven to be very capable of handling automated messages for casual information transfer, it does not appear to be reliable or flexible enough for transmissions where data quality, timely submission and ease of data management are the main issues. For this reason, email submission should only be supported as a secondary means of data transfer.

There are several other possibilities for data transmission technology, however a successful system must accommodate all of its users. Since it is unlikely that all of the smaller organisations can support something like ODBC, SQL*Net or similar protocols, adopting one of these would not meet the overall goals of the system.

3.2.3 Encryption

If required for privacy, the data could be encrypted prior to transmission. There are several commercial and public domain software packages that can be used to encrypt the data files before transmission. Depending on the encryption software used and the platform it is run on, it may be possible to automate this process.

To ensure choice of software packages by the users, any supported encryption schemes should be based on public domain algorithms that have been implemented by more than one vendor. The encryption scheme selected should be supported by software packages that run under both Windows and UNIX.

3.2.4 Data Validation

Using both EMS and RAPIDS, reported data can be processed against the various regulatory licenses and limitations. This will require modifications to both systems, but once implemented, they should be able provide the necessary information to automatically process nearly all reported data.

Automated email messages can be used to transmit results of processing to parties with an interest in the data. This should serve to alert the various parties when triggering events occur with the data, such as a limit violation, or invalid data transfer.

Web upload facilities can be blended with automated checking routines to interactively validate or assess uploaded information.

3.2.5 Data Access

There should be a visual interface to the data so the involved parties can view the data as required. If the data interface were made available to users via the Internet, all parties would have access to the data without delay. The interface should have comprehensive search capabilities and printable reports should be provided where required

If privacy and security are deemed to be requirements, a web-base interface, and the data itself should be protected and encrypted as required. The web site would require Secure Sockets Layer (SSL) and may support client certificates if physical client machine validation is required.

Both RAPIDS and EMS support end user validation through password protected database accounts. The EMS system also uses role-based security for control of access to specific tables. Neither system uses database level control of access at the row level although EMS does provide some views that limit the returned rows based on user roles.

If either of the databases were made directly available to the end users, providing full data privacy will require changes. If a separate repository for end user access is created, security should be built into the system down to the row level where required. This would likely involve using a product as Oracle 8.1.x where fine-grained access control is available.

Since it is unlikely that direct access to EMS or RAPIDS systems (the "transactional" systems) by outside users is required or even desired, a repository should be built specifically for reporting and querying. By doing this, security requirements can be built in directly to the underlying database.

It is also important to note that a repository would also be designed for optimal querying and reporting. By their nature, transactional systems such as EMS are not easy to query, and complicated information requests can often take a long time and consume much of the system resources, affecting other users.

3.2.6 Data Confidentiality

The RAPIDS system contains limited mechanisms in place for confidentiality of information stored in the system. RAPIDS is designed to work with a almost any SQL database and does not attempt to use specific security features such as fine-grained access as found in Oracle. In addition, there is no specific security other than database user accounts and passwords and confidentiality flags on some tables.

In such an environment, it is not possible to maintain full data confidentiality when users are essentially permitted full access to the data stored in the tables. To provide full confidentiality of data between users, some changes are required to the RAPIDS system.

An approach may be implementing "fine-grained access control" in the underlying database. This would involve a minor structural change to the tables deemed to contain confidential data and some special programming in the database to enforce confidentiality. Another mechanism may be to programmatically enforce confidentiality through data views, application coding or other means.

Regardless of the method chosen, some effort will be required to preserve full confidentiality of data among the users.

3.3 Conceptual Architecture

Several key features distinguish the architecture for electronic data and information transfer between AENV and Industry:

- Information transfer is best facilitated through interactive interfaces that can supply and feedback information as required.
- Information for and from industry may be split between multiple AENV systems (EMS and RAPIDS for example).
- An intermediary security layer must protect information for and from AENV systems.

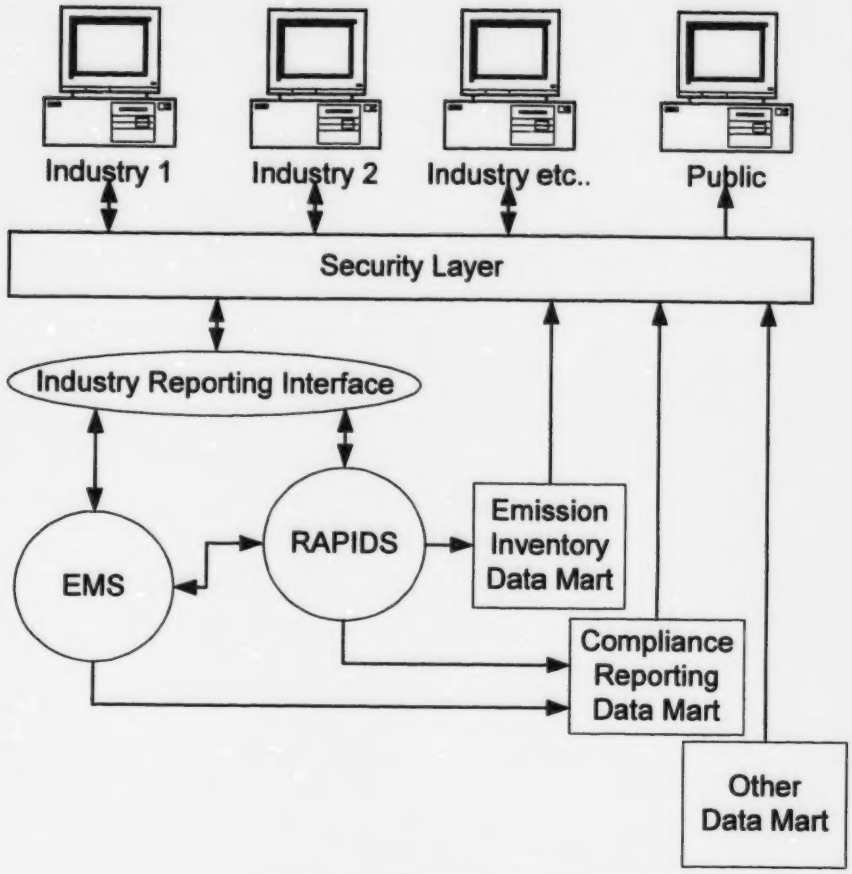


Figure 2 Conceptual Architecture

Figure 2 illustrates the following features:

- AENV systems are isolated by a security layer that allows pre-defined levels of access to identified external parties.
- Information is submitted through a common interface that distributes data as required to the various information systems.
- RAPIDS and EMS data sets are linked to facilitate combined query operations.
- Information is assembled for distribution by specific Data Marts that draw information from different systems as required.

4 NEXT STEPS

With the quick development of the information backbone that now connects governments, industry, other organisations, and the general public, opportunities now exist to develop common systems and common information exchange mechanisms.

Through this project:

- RAPIDS has been identified as a component that can maintain emissions inventory information for AENV.
- Concepts have been presented to industry and feedback solicited towards how information transfer can be streamlined.
- Concepts have also been presented how government agencies can work together to support and maintain common information systems.

The next step requires:

1. A review of Alberta Environment's business processes. This business process review not only needs to examine the internal functioning of AENV it also needs to examine how AENV can work together for common benefit with other agencies and industry.

2. This business process review serves to define information requirements, and these information requirements serve as the basis from which the design and development of data repositories, and the interfaces for information submission and reporting can proceed.
   - This process can be coordinated with the current update of the Air Monitoring Directive
   - This process can also be coordinated with the current Clean Air Strategic Alliance (CASA) initiative.

3. At the same time, there is a pressing need for AENV to create the year 2000 Emission Inventory for Alberta. An information system must be implemented in time to manage this information set.

4. For this implementation to be successful, a formal analysis of the information linkages between RAPIDS, EMS and other AENV systems must be performed. This will identify information standards and structural modifications or enhancements to ensure data set compatibility and consistency.

APPENDIX I: WORKSHOP MATERIALS

RAPIDS

Regional Air Pollutant Inventory Development System

Alberta Environment
Dec 2, 1999 Workshop

Workbook

by
Neil Shrimpton

LGS Group Inc.
56 Bastion Square
Victoria BC
(250) 380-6377

LGS

Table of Contents

1 INTRODUCTION 3
2 WORKSHOP EXAMPLE CASE 5
3 BASICS 6
3.1 Logging into RAPIDS 6
4 GEOGRAPHIC MODULE 9
5 ENTERING SOURCE INFORMATION 11
6 ENTERING DEVICE INFORMATION 13
7 ENTERING PROCESS INFORMATION 18
8 DESCRIBING INFORMATION ON BASE QUANTITIES 28
9 DESCRIBING EMISSION INFORMATION 31
10 REPORTING INFORMATION 34
10.1 Generating a Summary Report 35
10.2 Extracting Data Files 37

1 INTRODUCTION

RAPIDS is an Emission Inventory system to assist with the book keeping associated with describing the various emissions associated with a facility.

This workbook will describe the series of steps required to describe a facility using RAPIDS, and to use RAPIDS to report information.

The series of steps comprise:

1. Describing the facility

   Information on a facility is split into the following hierarchy
   - Source Information
   - Devices Information
   - Process Information
   - Stream Information

   Source information describes the facility location, address, contact information, and SIC code.

   Device information describes the devices associated with the facility. Devices include equipment such as boilers, control devices, and stacks. The description of the devices also includes the connections between them, and device specific SIC codes.

   Process information details the physical processes that occur within the given devices. Examples are combustion (originating device), filtering (control device), and discharge (stack device). Information on the process includes SCC codes, operational mode (startup, shutdown, normal, etc) and operational schedule.

   Stream information describes the paths of material flow into and out of processes.

2. Describing information on base quantities.

   In RAPIDS such information is described as 'Activity' information associated with a stream.

   For an originating device, fuels and raw materials are described for an input stream to the device processes, products, and by-products are described for an output stream from these processes.

3. Describing Emission Information

   In RAPIDS Emission information is also described as 'Activity' information associated with a stream.

   Emissions are created at an originating device, and are described for the output stream associated with the originating process. Emissions can flow directly to the environment or through a succession of control devices until they are discharged to the environment.

4. Reporting Information

   Information can be extracted as reports from RAPIDS, and information can be exported from RAPIDS for transfer to another database system.

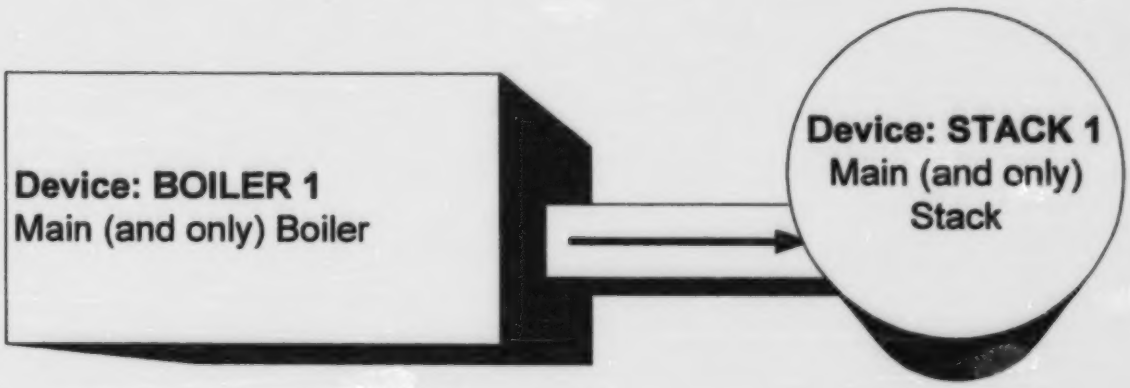
5. Using the Emission Estimator

   RAPIDS provides procedures for estimating emissions from processes given that the base quantities associated with the process have been described.

2 WORKSHOP EXAMPLE CASE

This workshop will go through the process of using RAPIDS to describe the emissions associated with the following fictitious facility.

Source: FCBF
Fictitious Coal Burning Facility



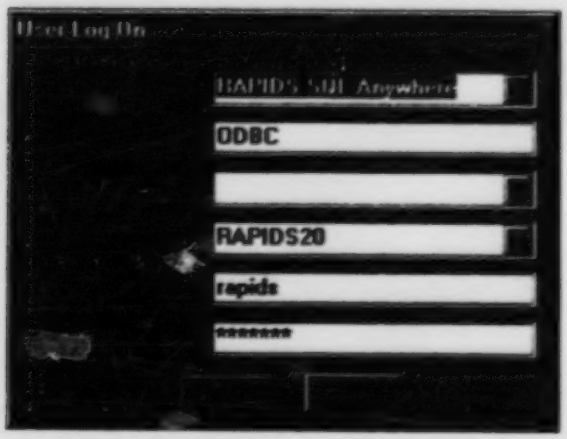
In the device '**BOILER 1**' coal is combusted at atmospheric pressure to generate electricity. This facility has an SIC of 4911. This process is identified as '**BURN 1**', and involves coal combustion in an atmospheric pressure boiler for electricity generation using a travelling grate stoker. Thus the process has a SCC of 10100102. Over the course of the year 1999, 15,000 Metric Tonnes of Coal are consumed.

BOILER 1 is connected to **STACK 1** where the process of discharging to the atmosphere is identified as '**EMIT 1**'.

3 BASICS

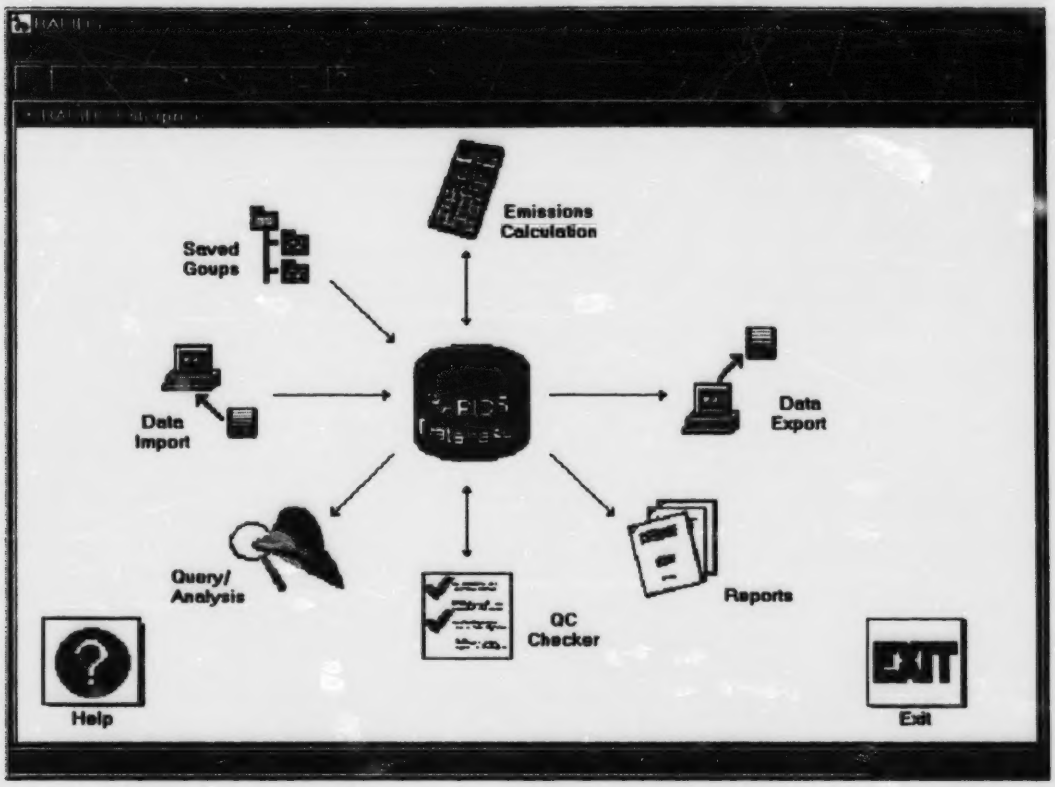
3.1 Logging into RAPIDS

1) Start the RAPIDS program from your computer. The User Log On screen will appear.

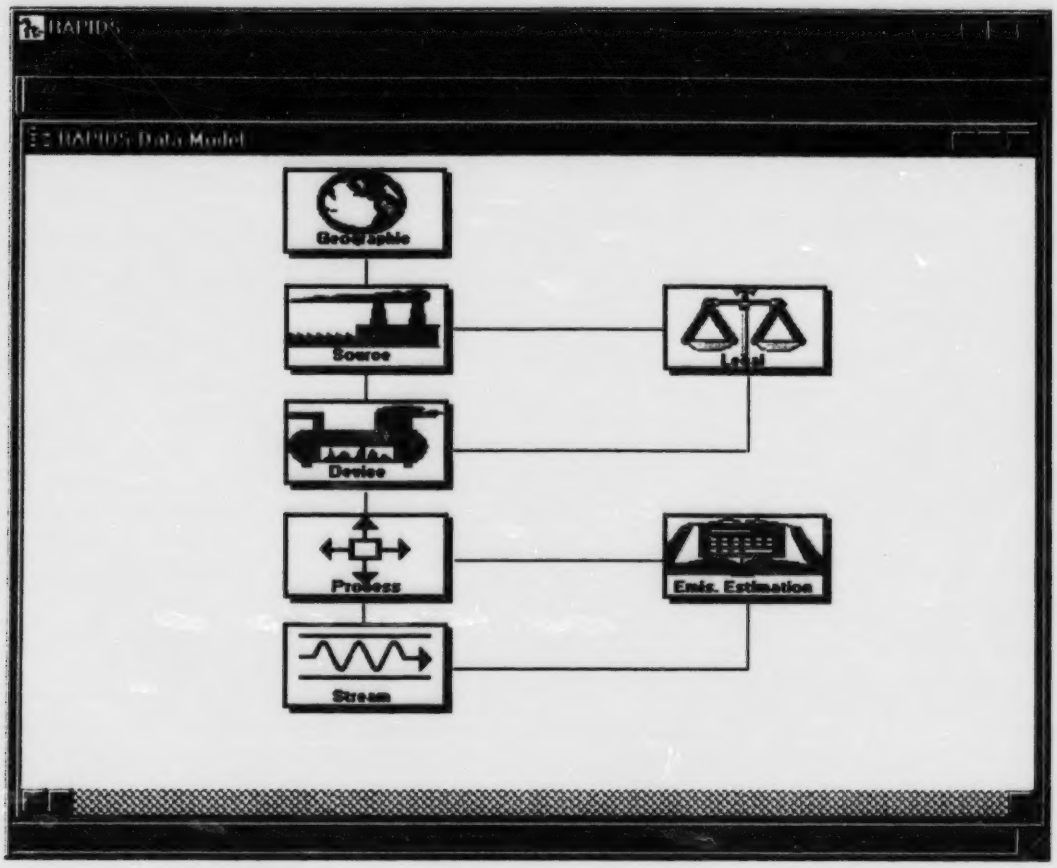


2) Note that the default profile name 'RAPIDS SQL Anywhere' will be displayed on the User Log On screen.

3) Click on **OK** to go to the RAPIDS Enterprise Screen, shown below.



Proceed with describing the Fictitious Coal Burning Facility by clicking on the RAPIDS database icon. This will take you to the RAPIDS data model screen shown below.



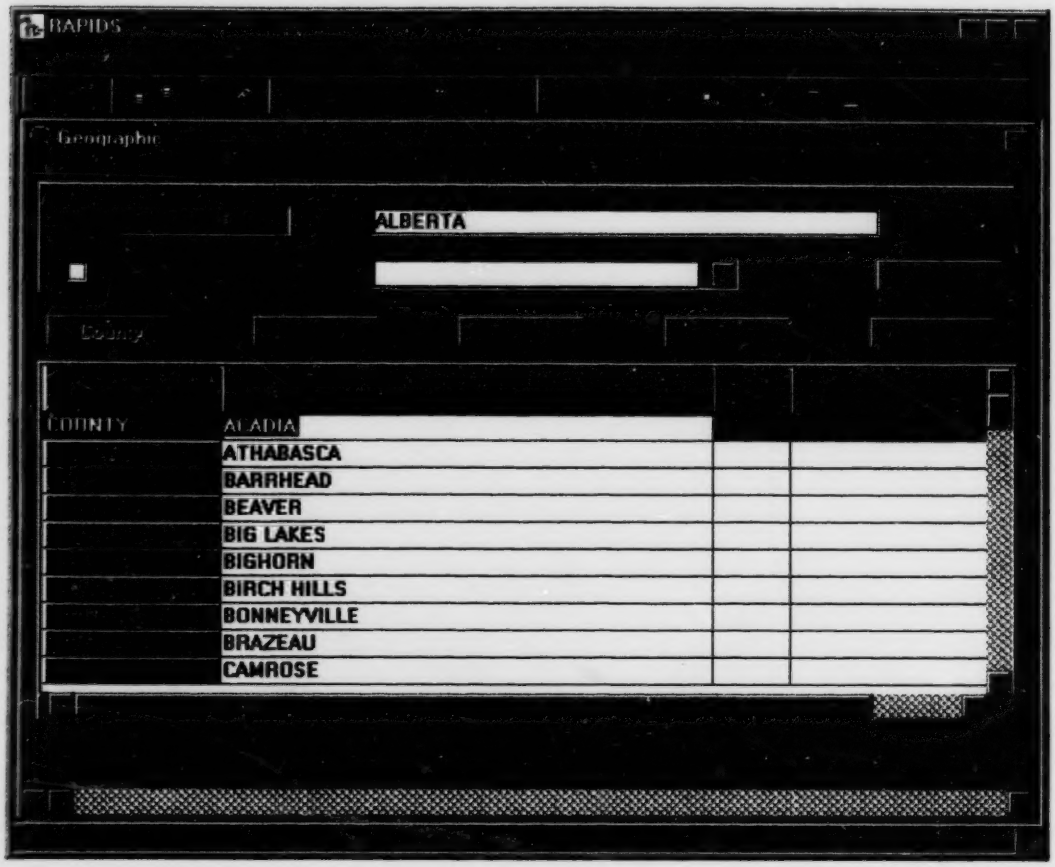
Selecting the Geographic model will allow you to view and maintain geographic information in RAPIDS. Select the Geographic module.

4 GEOGRAPHIC MODULE

The main screen of the geographic module provides the following information.

Select the 'STATE' of Alberta by double clicking on the row in the table.

The following list of counties and municipal districts will be displayed.



Close the geographic module by clicking on the 'x' in the Geographic sub-window. (Do not click the 'x' in the extreme top right as this will cause RAPIDS to exit.)

5 ENTERING SOURCE INFORMATION

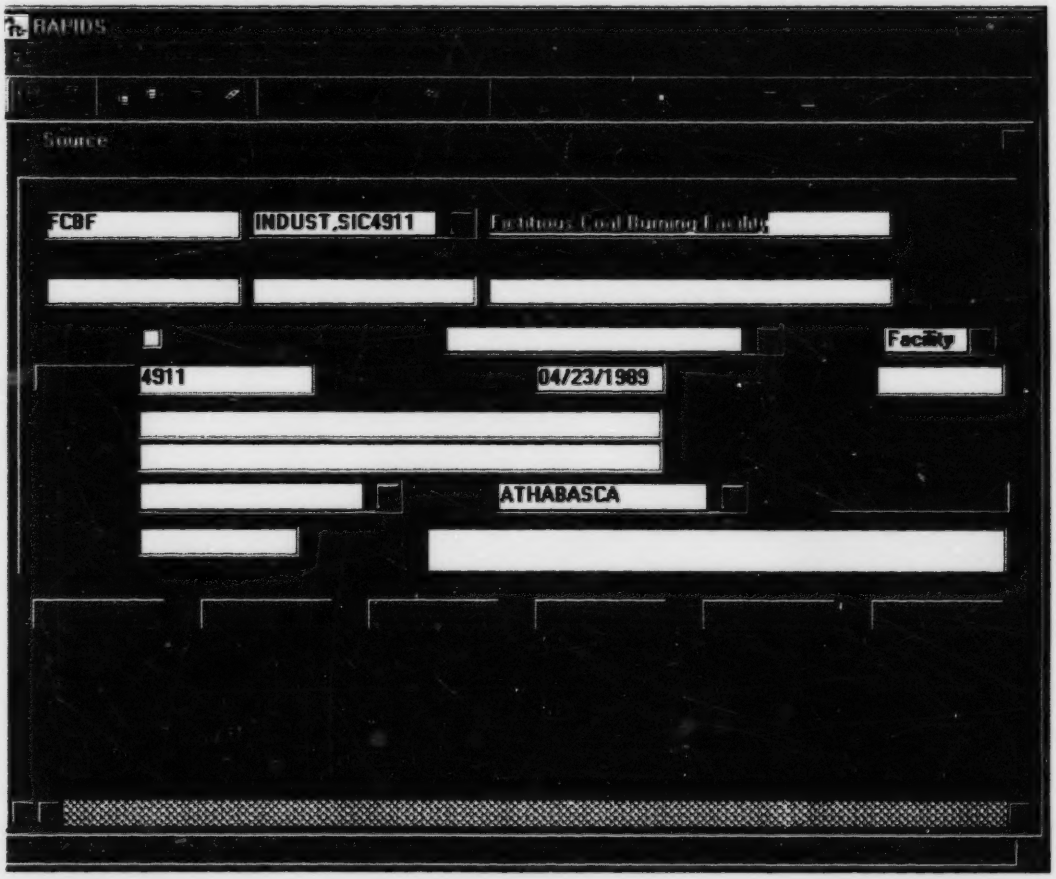
Select the Source module from the RAPIDS data module screen.

Click the insert Icon in the tool bar to insert a new source.

The information to be entered is:

Agency Source Id:	FCBF
Code:	INDUST,SIC4911
Name:	Fictitious Coal Burning Facility
Type:	Facility
SIC Code:	4911
Begin Operation Date:	04/23/1989
County:	ATHABASCA

When this is complete the RAPIDS screen should resemble:



Click on the Save icon to save this information to the database.

Click on the Device button in the lower group of buttons to proceed with filling in information on the devices associated with the Fictitious Coal Burning Facility.

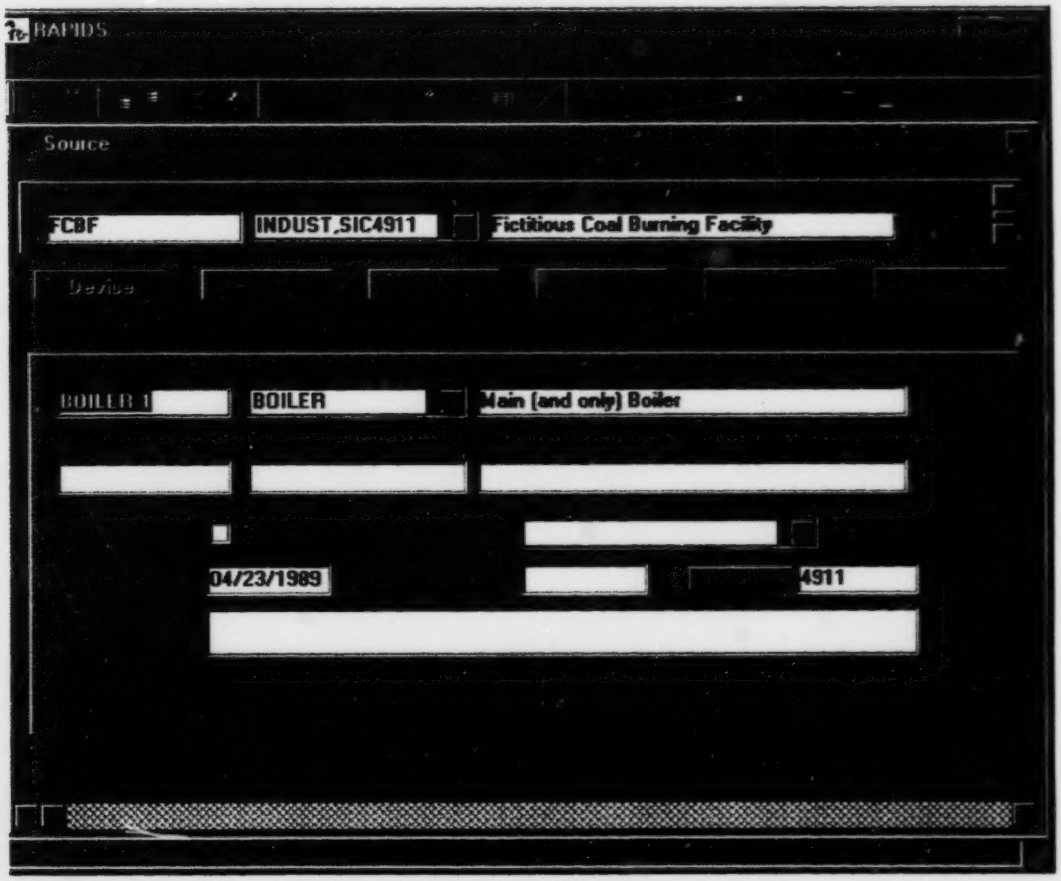
6 ENTERING DEVICE INFORMATION

Select the FreeForm view from the option list under the view menu, and click on the insert icon.

Enter the following information on the boiler:

Agency Device Id:	BOILER 1
Code:	BOILER
Name:	Main (and only) Boiler
Installed Date:	04/23/1989
SIC Code:	4911

When this is completed the RAPIDS screen should resemble.

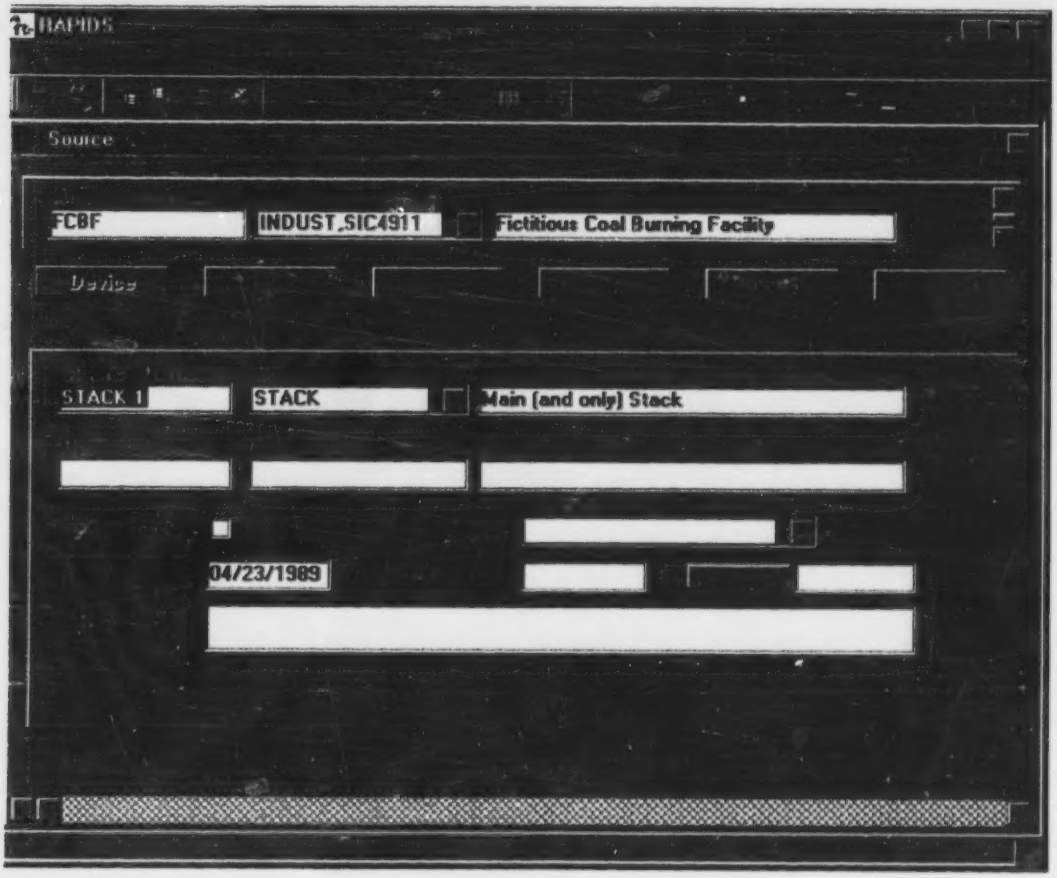


Click on the save icon to save this information to the database.

Click on the insert icon again and enter the following information to describe the stack:

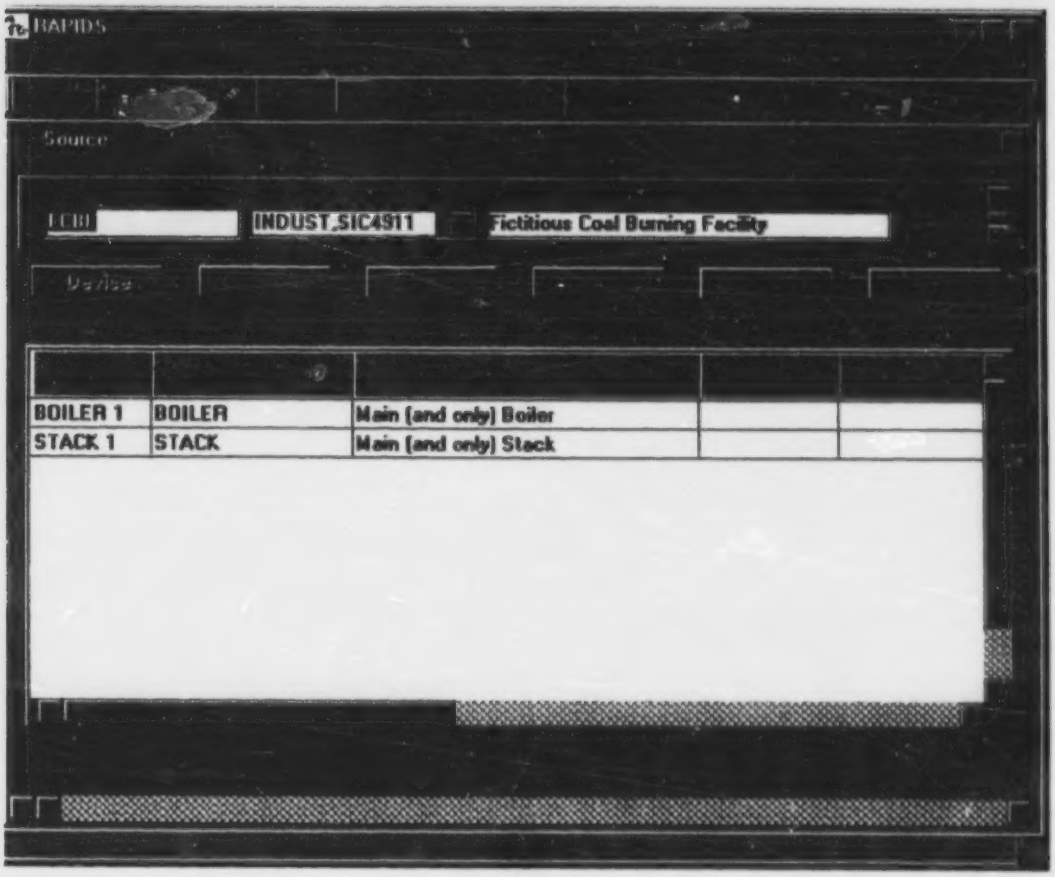
Agency Device Id:	STACK 1
Code:	STACK
Name:	Main (and only) Stack
Installed Date:	04/23/1989

When this is completed the RAPIDS screen should resemble.

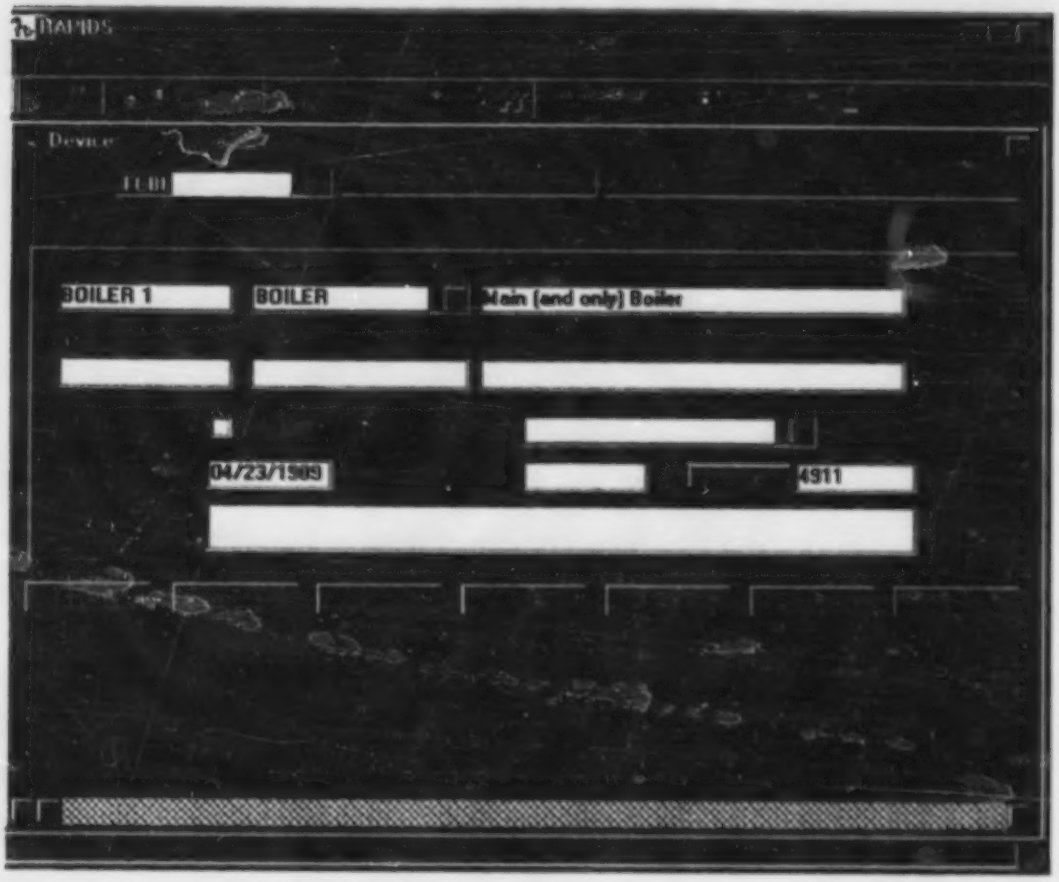


Click on the save icon to save this information to the database.

In the view menu select the Tabular option to show the list of devices associated with this source.



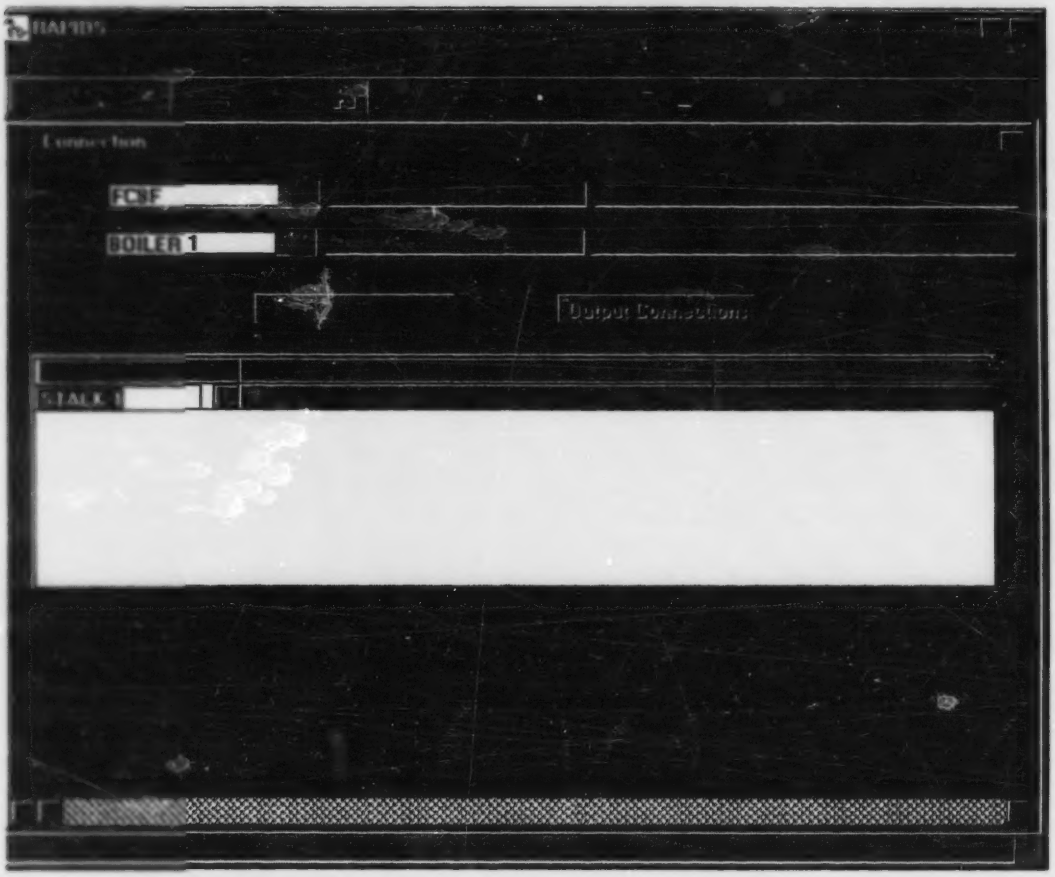
Double click on the 'BOILER 1' row in the devices table, and you will be presented with the following 'Device screen'.



Click on the Connection button in the lower row of buttons to identify the connections between the identified devices.

Select the Output Connections button on the screen and click on the insert icon.

Select STACK 1 from the list of 'Device Id's in the newly created row. The screen should resemble.



Click on the save icon to save this information to the database. Close this window by clicking on the 'x' in the upper right of the Connection sub-window. (Do not click on the 'x' in the top right corner as this will cause RAPIDS to exit.)

You will be returned to the 'Devices Screen' as shown on the previous page.

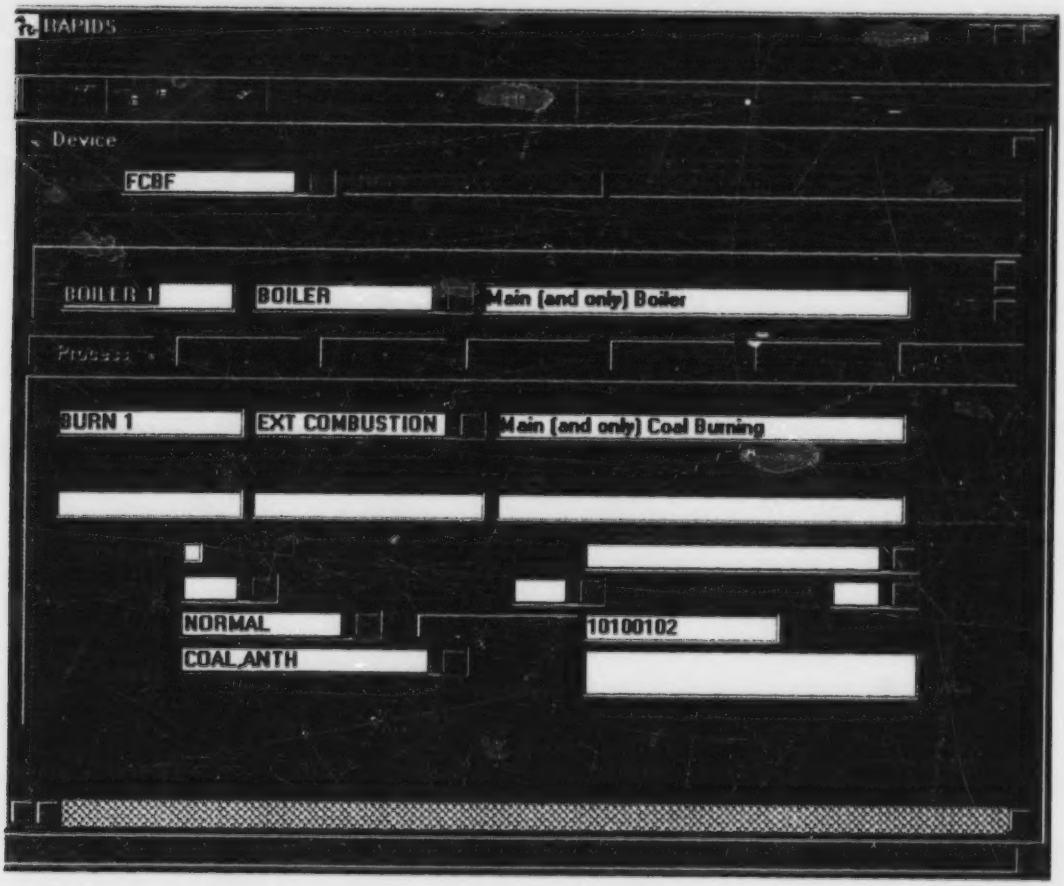
Click on the Process button in the lower row of buttons to proceed with filling in information on the process associated with BOILER 1.

7 ENTERING PROCESS INFORMATION

Select FreeForm from the menu of view options and click on the insert icon and enter the following information to describe the combustion process associated with the boiler.

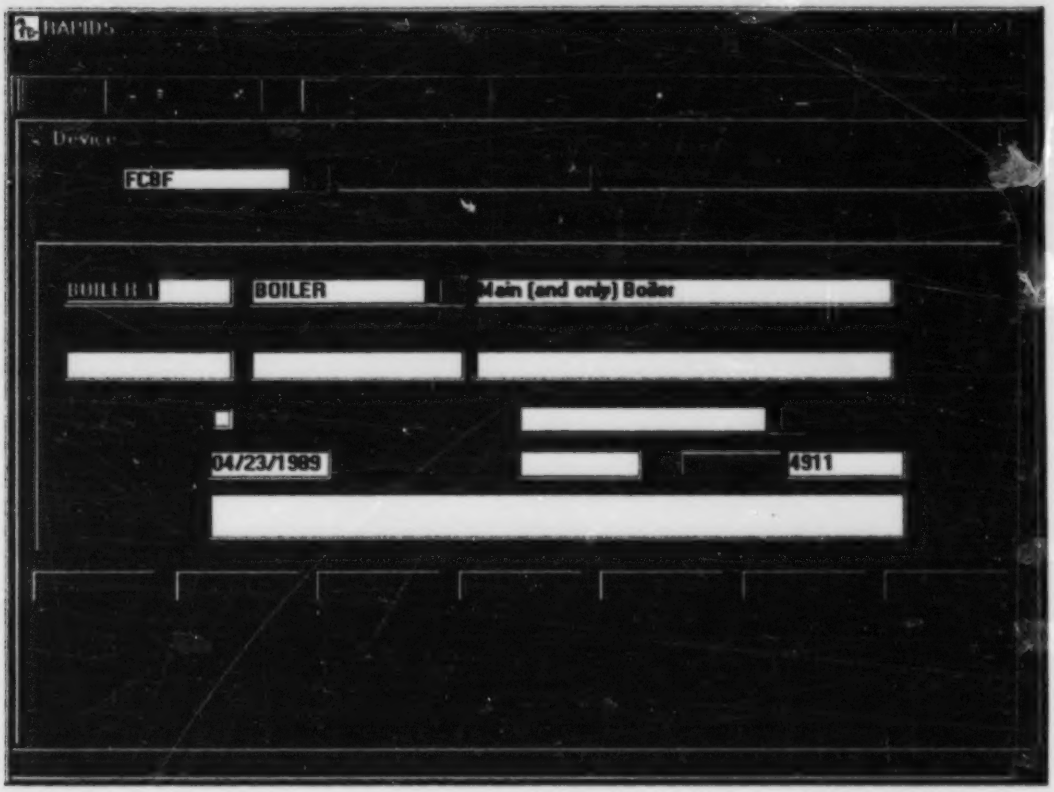
Agency Process Id:	BURN 1
Code:	EXT COMBUSTION
Name:	Main (and only) Coal Burning
Mode:	NORMAL
SCC/AMS Code:	10100102
Primary Material Code:	COAL,ANTH

The screen should resemble



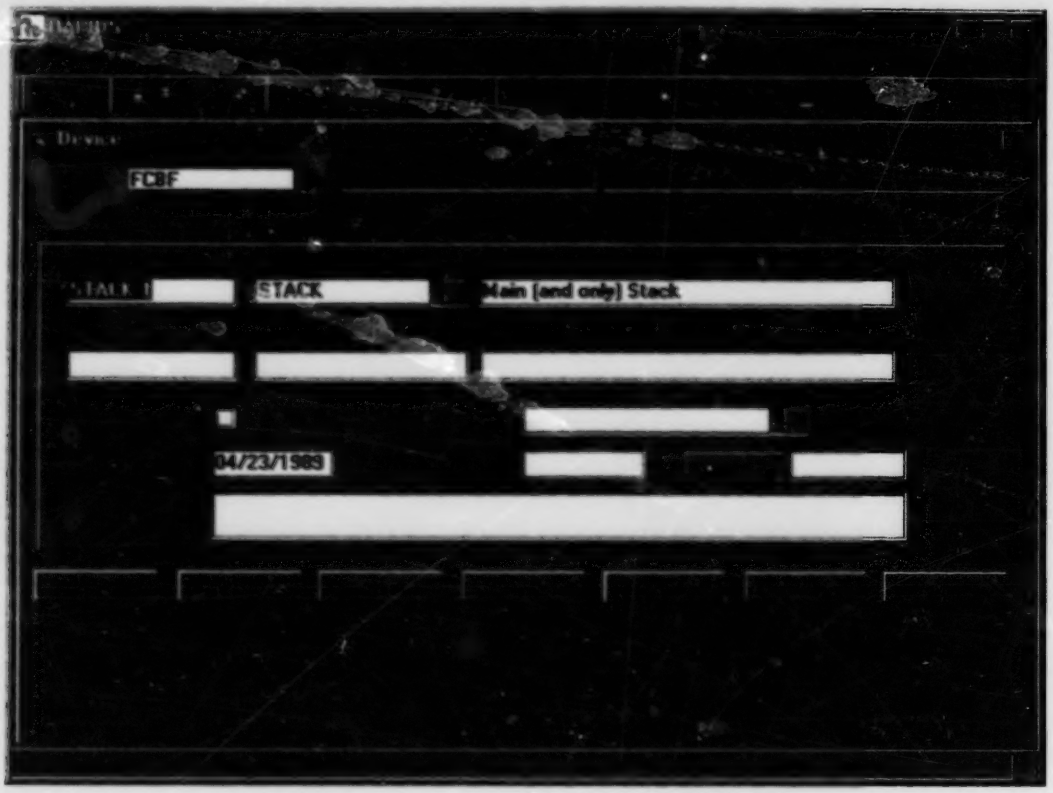
Click on the save icon to save this information to the database.

Under the view menu select the 'Enlarge General Info' option. The screen will now appear as



Click the forward arrow in the toolbar to move to the record containing the information for **STACK 1**.

The screen should look like

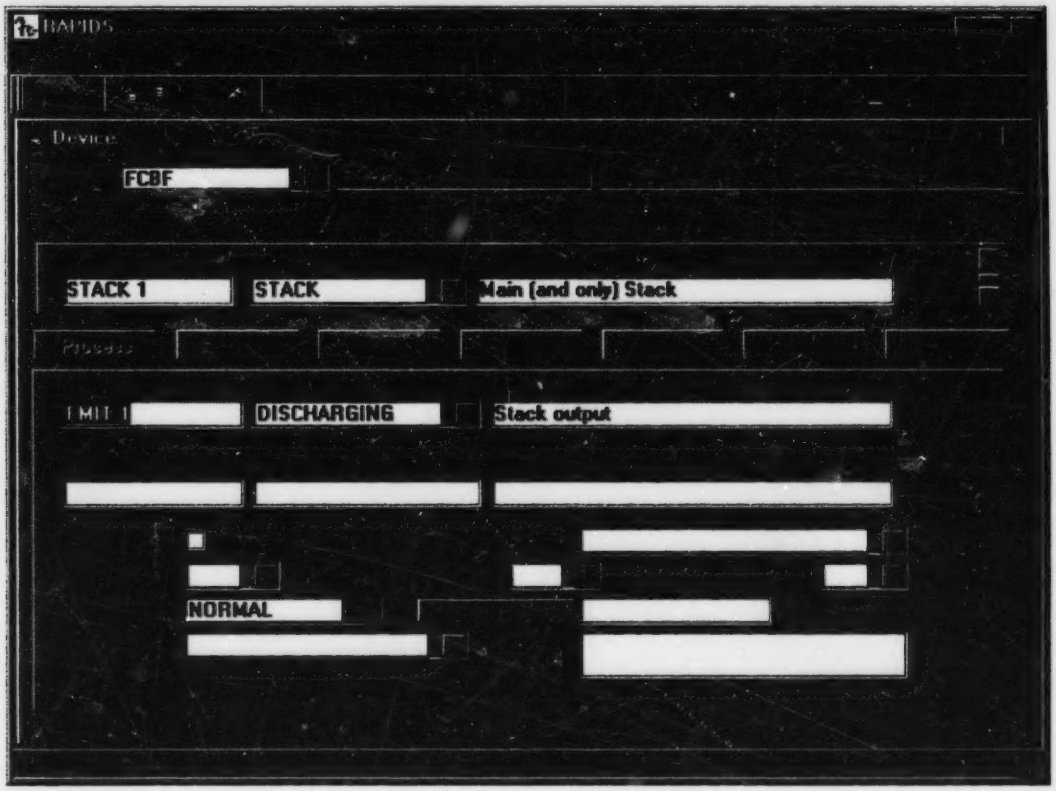


Select the process button on the lower row of buttons to proceed with filling in information on the process associate with discharging from a stack.

Select FreeForm from the menu of view options and click on the insert icon. Enter the following information to describe the stack discharge process.

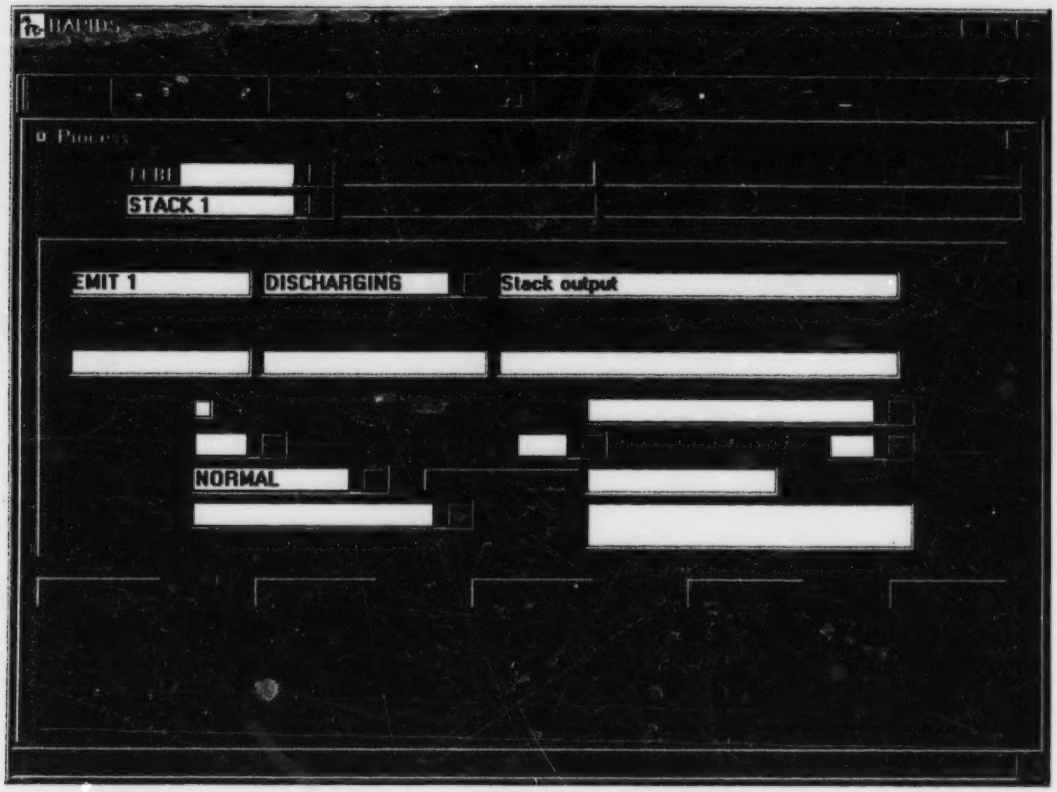
Agency Process Id:	EMIT 1
Code:	DISCHARGING
Name:	Stack output
Mode:	NORMAL

The screen should resemble



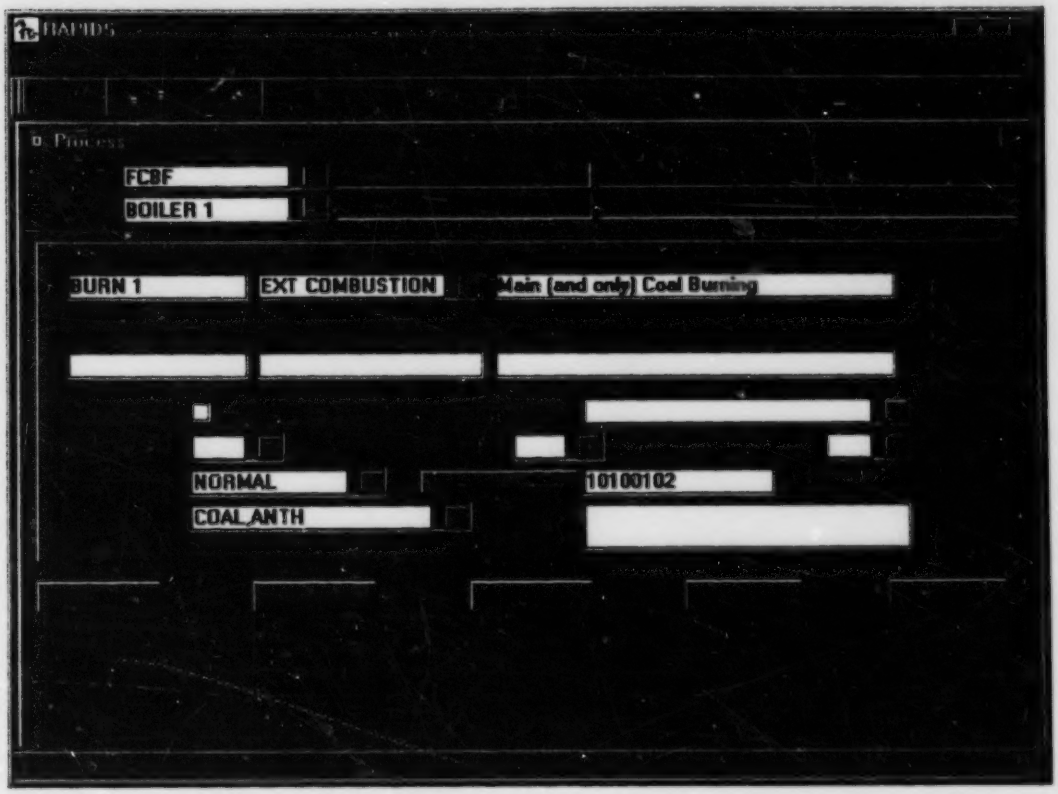
Click on the save icon to save the information into the database.

From the view menu select tabular and double click on the **EMIT 1** row to display the 'Process screen' associated with this process. The screen should appear as



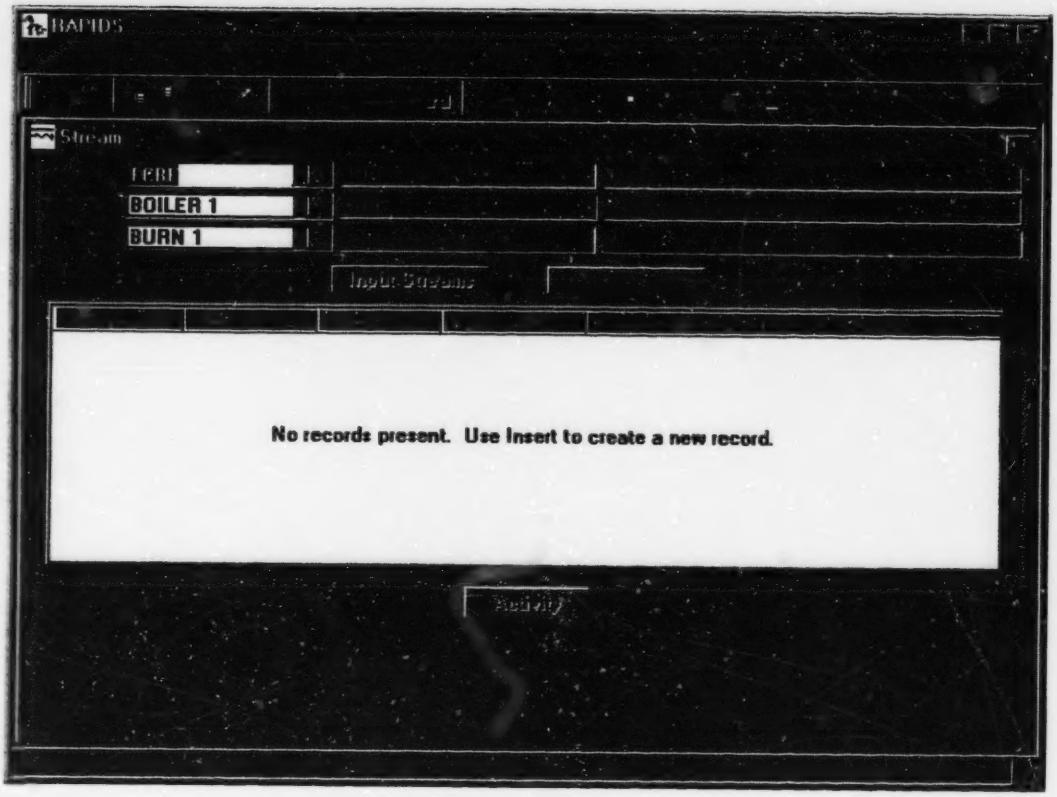
On this Process screen information on the top line identifies the Source, the second line identifies the Device, and the main block provides information on a particular process. On the line identifying the Device, change the selection from '**STACK 1**' to '**BOILER 1**' from the drop down list of Devices identified for this Source.

The screen should appear as



Click on the Stream button on the lower row of buttons to proceed with identifying the streams associated with the flow of materials through the identified processes.

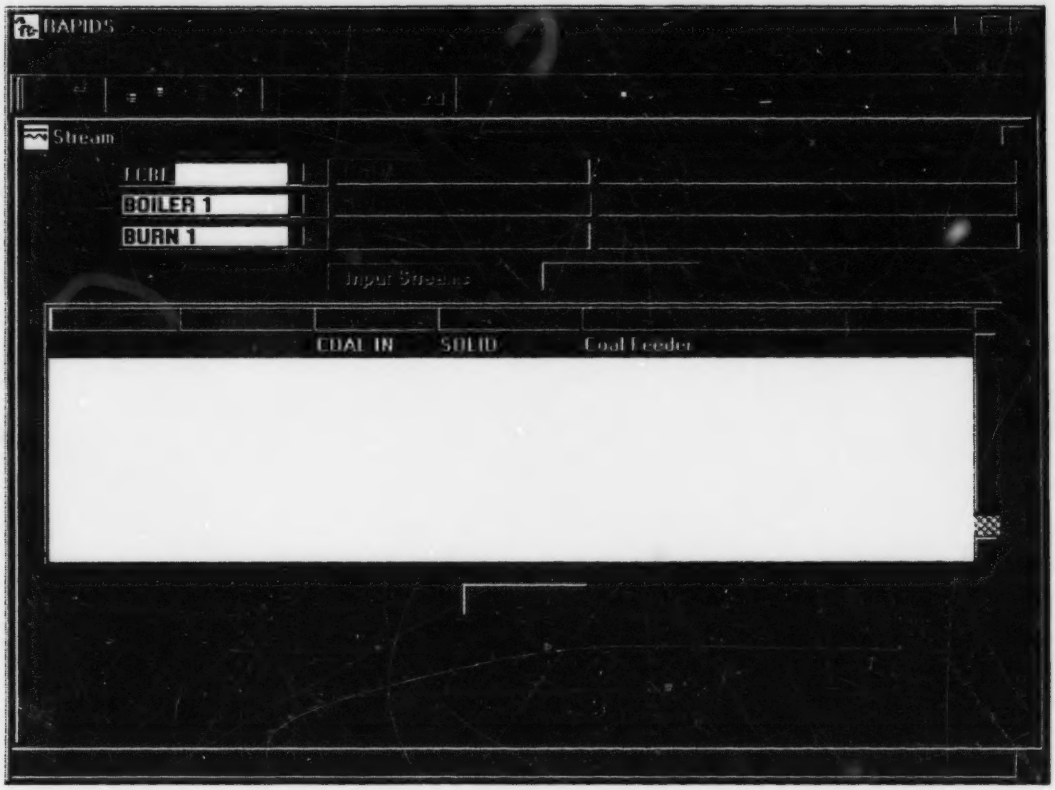
When the stream button on the process screen is selected for the **FCBF** source and the **BOILER 1** device and the **BURN 1** process, the following screen is displayed.



Click the insert icon and fill in the row with the following information

Stream Id:	COAL-IN
Stream Code:	SOLID
Stream Name:	Coal Feeder

The screen should appear as follows.

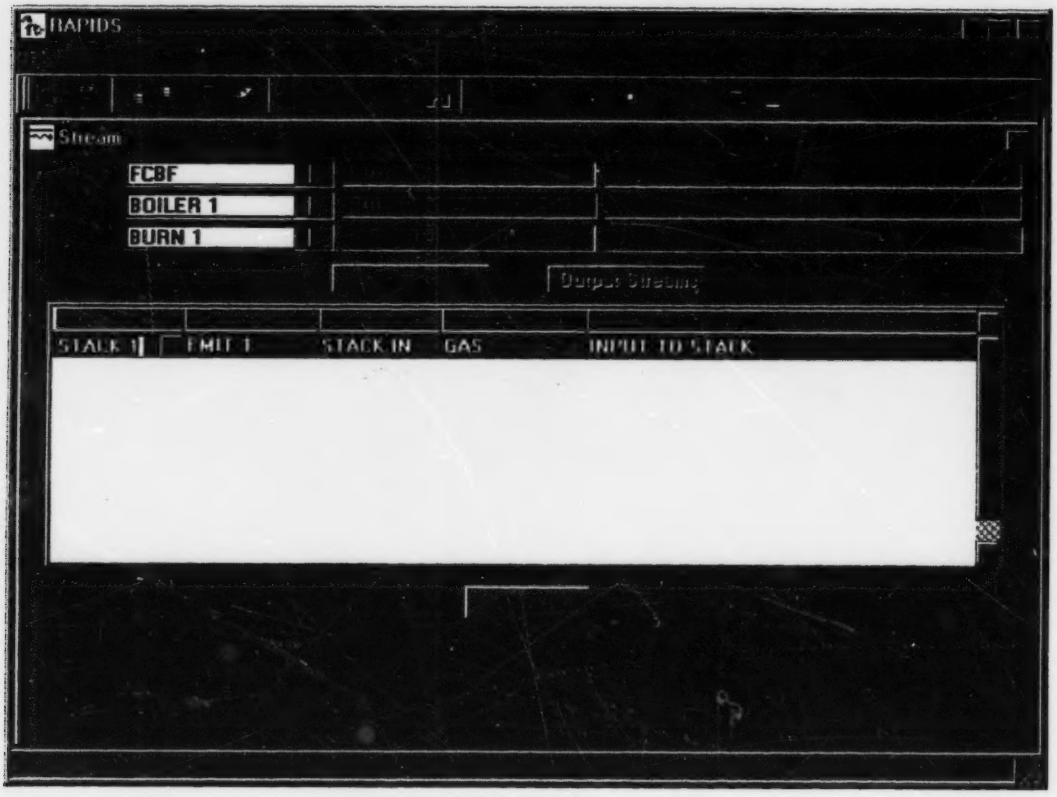


Click on the Output Stream button and then the insert icon.

Fill in the following information on the stream from the **BURN 1** process of the **BOILER 1** device to the **EMIT 1** process of the **STACK 1** device.

Device Id:	STACK 1
Process Id:	EMIT 1
Stream Id:	STACK-IN
Stream Code	GAS
Stream Name	INPUT TO STACK

The screen should appear as follows.



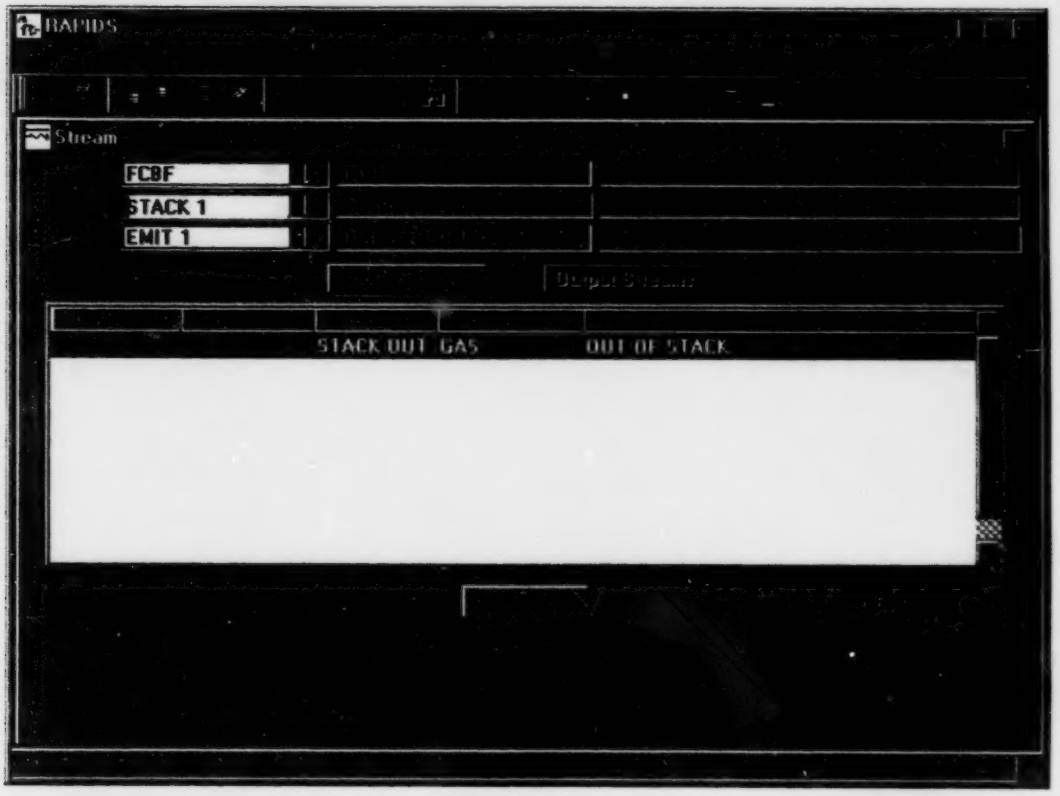
Click the save icon to save the information to the database.

In the Device list change the selection from **BOILER 1** to **STACK 1** and click on the insert icon.

Fill in the following information

Stream Id:	STACK-OUT
Stream Code:	GAS
Stream Name	OUT OF STACK

The screen should appear as follows

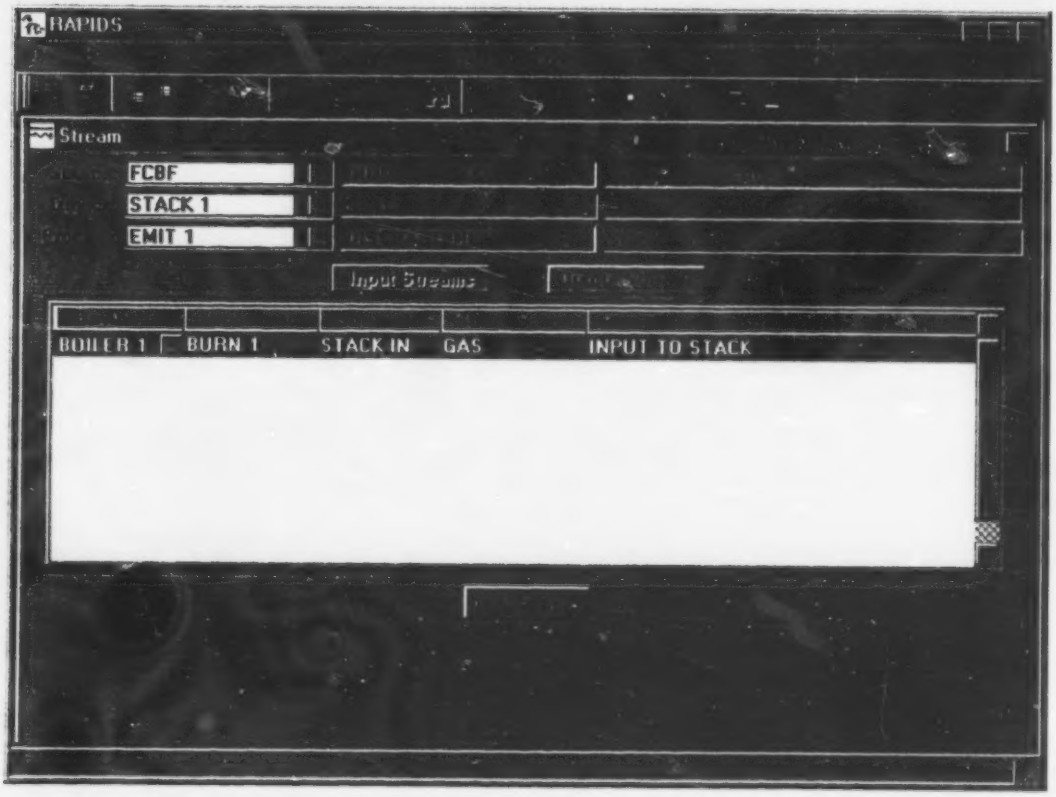


Click the save icon to save the information to the database.

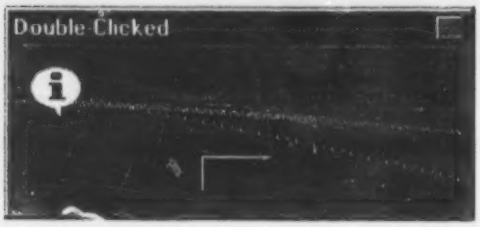
8 DESCRIBING INFORMATION ON BASE QUANTITIES

On the RAPIDS screen showing stream information it is possible to move forwards and backwards through the stream connections. This is accomplished by selecting either an Input or Output stream and double-clicking on the stream moving forwards through output streams to the different processes, or backwards through the input streams to the different processes.

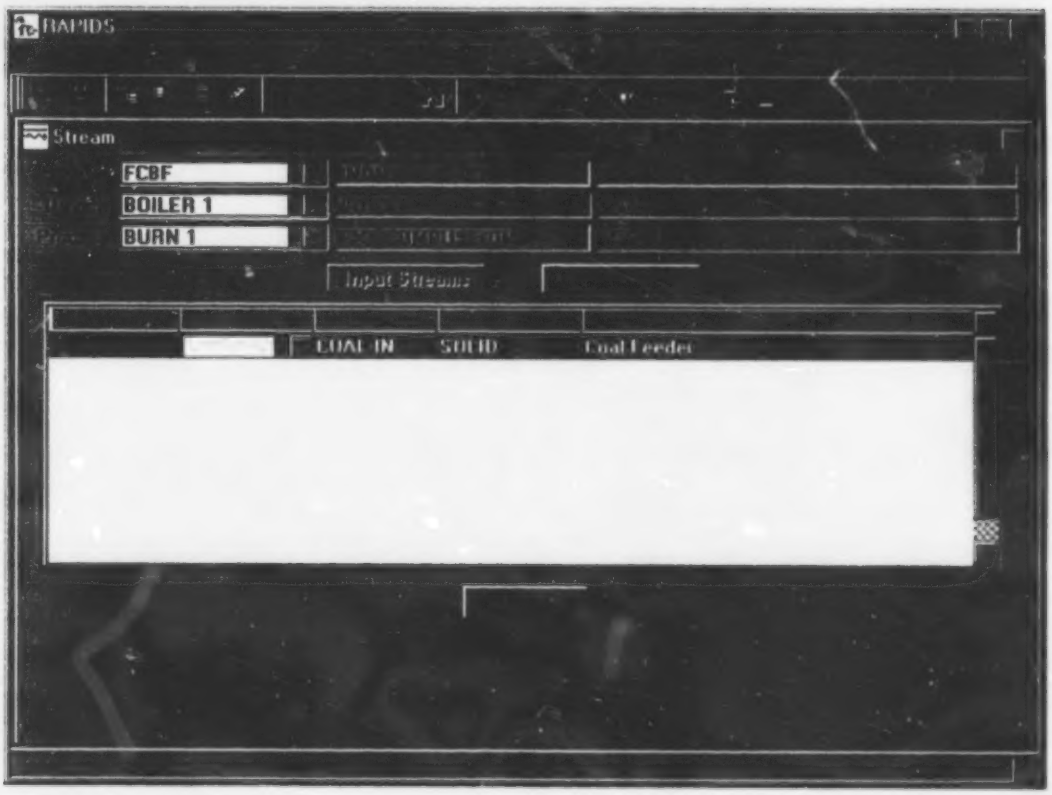
At the end of the last section, the output stream to the environment was identified. Selecting the Input Stream button should reveal the following screen.



Double-clicking on the listed stream will cause RAPIDS to display the successive streams moving backwards along the flow of material. At the first stream in the chain, RAPIDS will identify that



The screen at which this point occurs should resemble

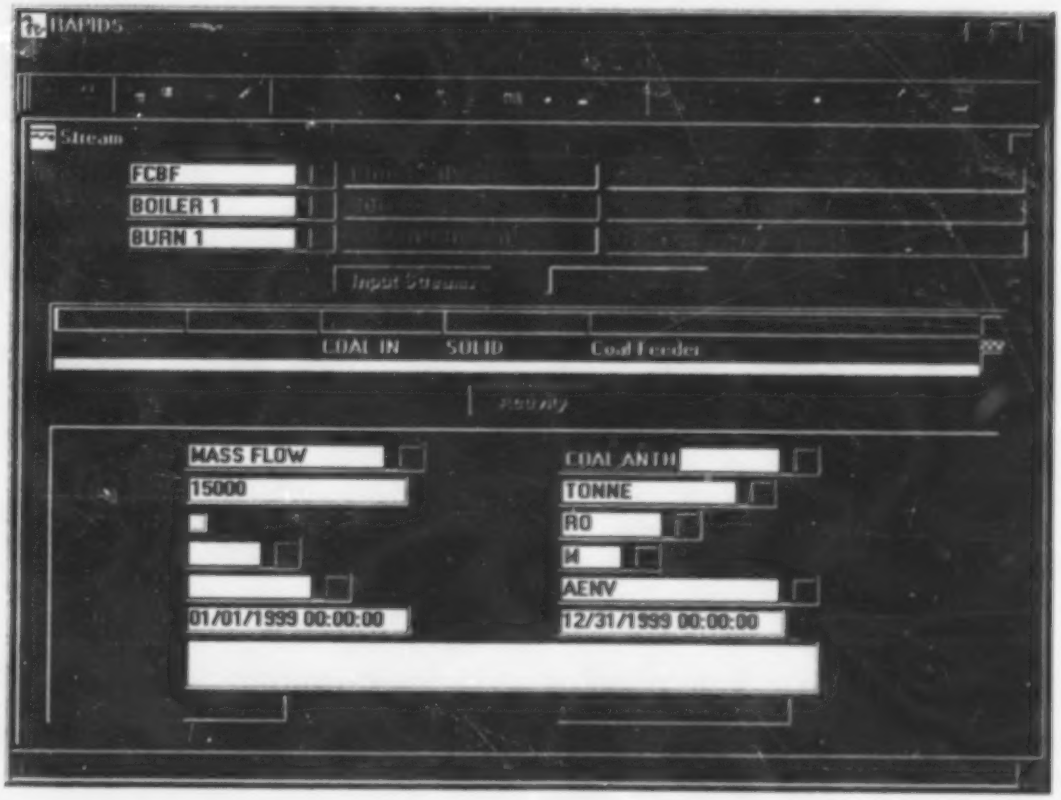


At this point, base quantity information can be recorded, by selecting the Activity button at the bottom of the stream information block.

Select FreeForm from the view menu and click on the insert icon to insert the following information.

Metric:	MASS FLOW
Material Code:	COAL,ANTH
Value:	15000
Value Unit Code:	TONNE
Data Code:	RO
Method Type:	M
Reference Code:	AENV
Start Date:	01/01/1999
End Date:	12/31/1999

The screen should appear as follows.

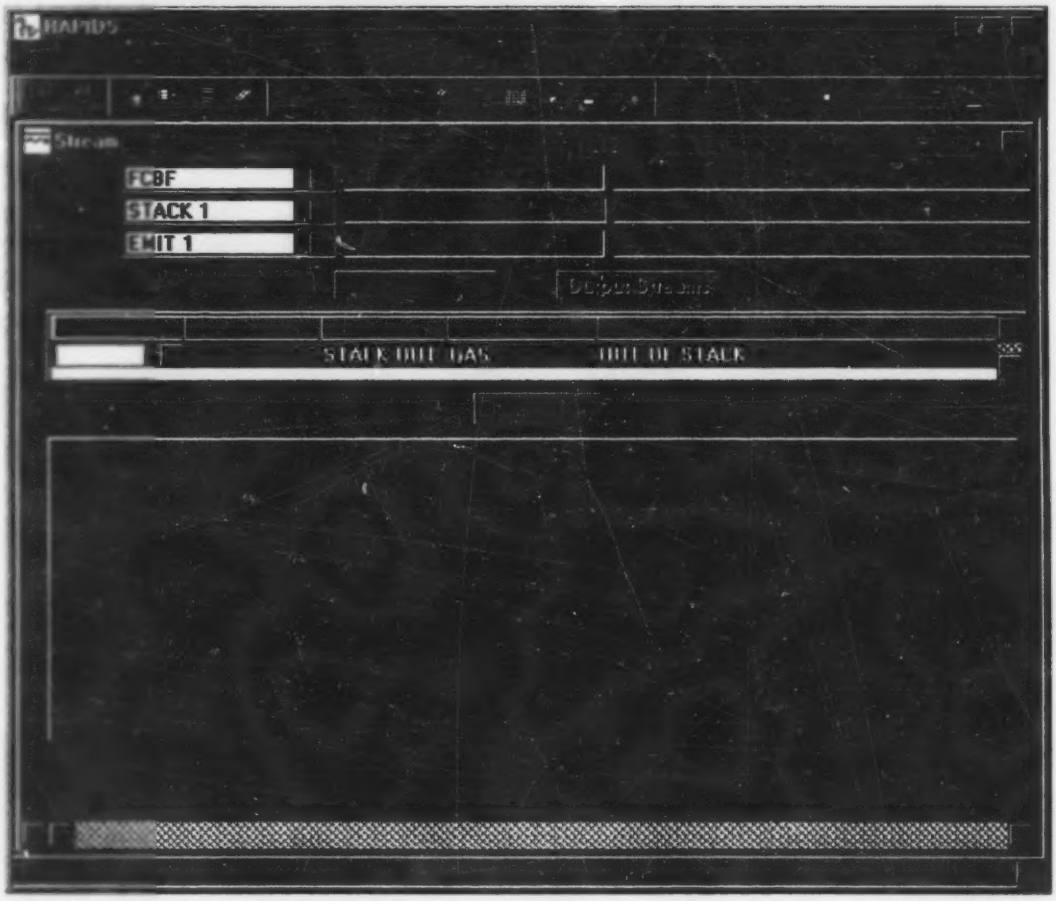


Click on the Save Icon to save the information to the database.

9 DESCRIBING EMISSION INFORMATION

On output streams it is possible to identify specific emission quantities that are DISCHARGED to the environment. To find the streams that are identified as leading to the environment, select the Output Streams button on the Streams screen and double-click on the listed stream(s) until RAPIDS reports that

The screen should resemble

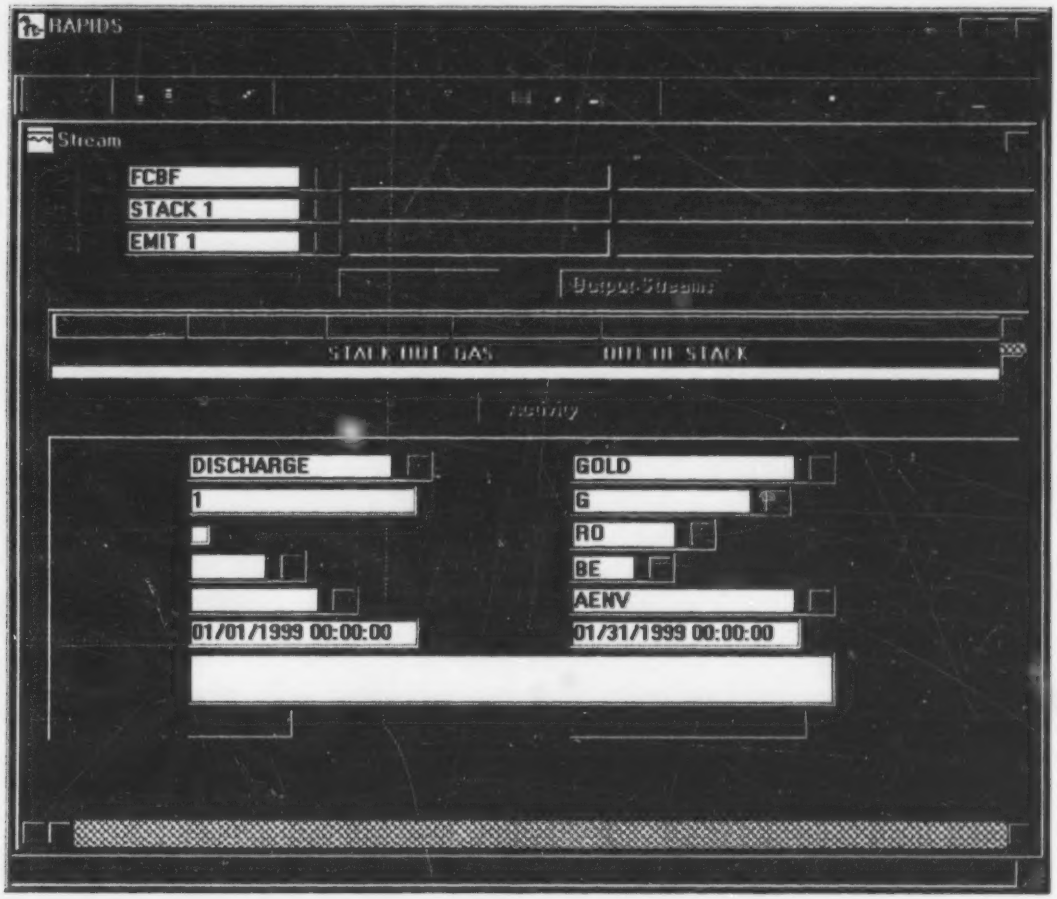


Select the Activity button.

Select the FreeForm view and click on the insert icon to insert the following information.

Metric:	DISCHARGE
Material Code:	GOLD
Value:	1
Value Unit Code:	G
Data Code:	RO
Method Type:	BE
Reference Code:	AENV
Start Date:	01/01/1999
End Date:	01/31/1999

The screen should appear as follows.

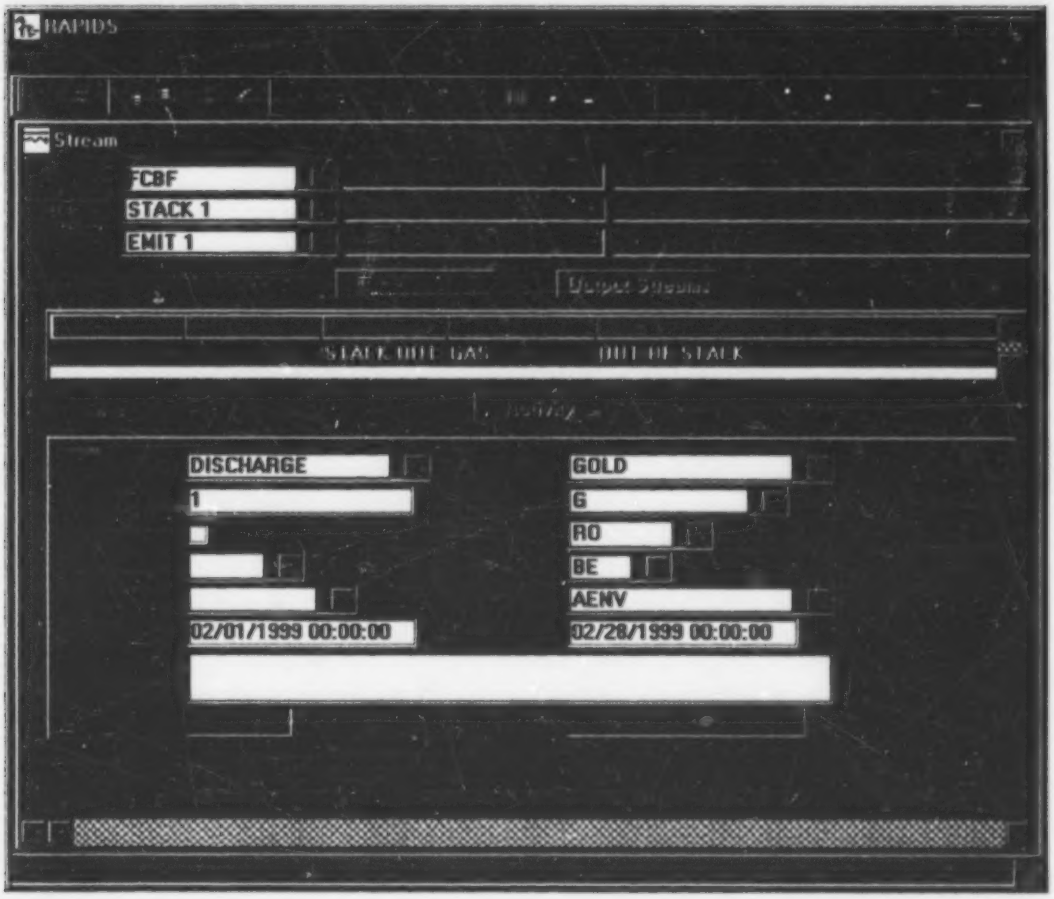


Click on the Save icon to save this information to the database.

Click on the insert icon again to insert the following additional information.

Metric:	DISCHARGE
Material Code:	GOLD
Value:	1
Value Unit Code:	G
Data Code:	RO
Method Type:	BE
Reference Code:	AENV
Start Date:	02/01/1999
End Date:	02/28/1999

The screen should appear as follows.

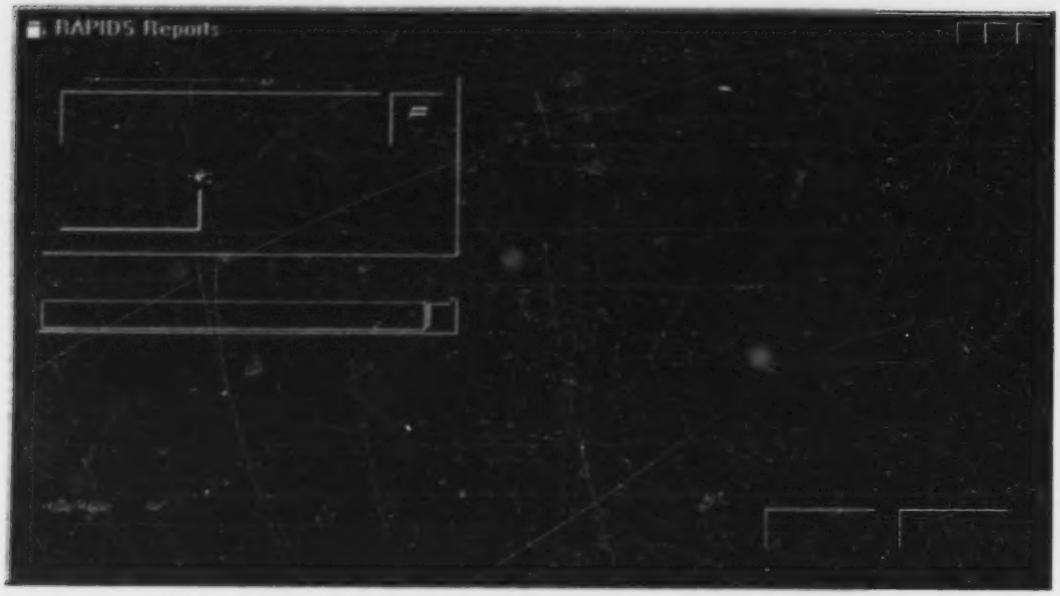


Click on the save icon to save this information to the database.

10 REPORTING INFORMATION

Rapids can generate summary reports, or extract data for submission.

To generate a summary report, under the Report menu select the Run Report option. The following screen will appear.

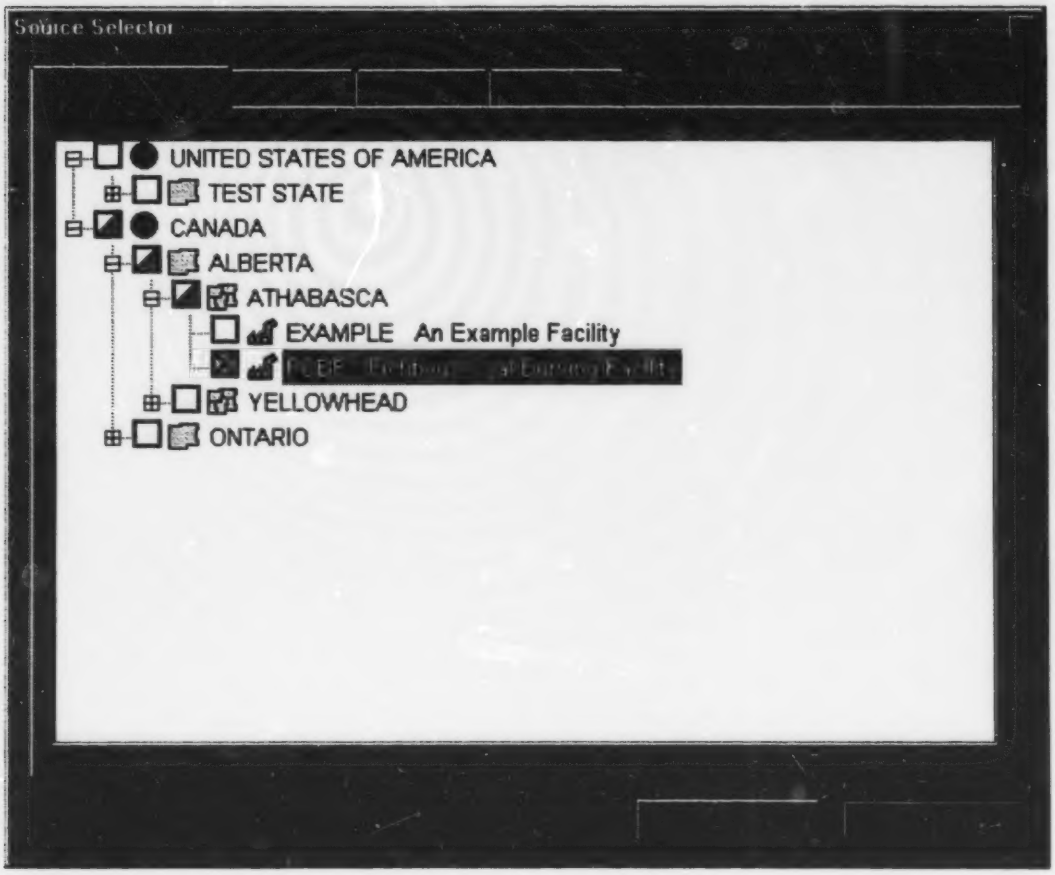


Click on the Source Selector to select which sources you wish to report on.

10.1 Generating a Summary Report

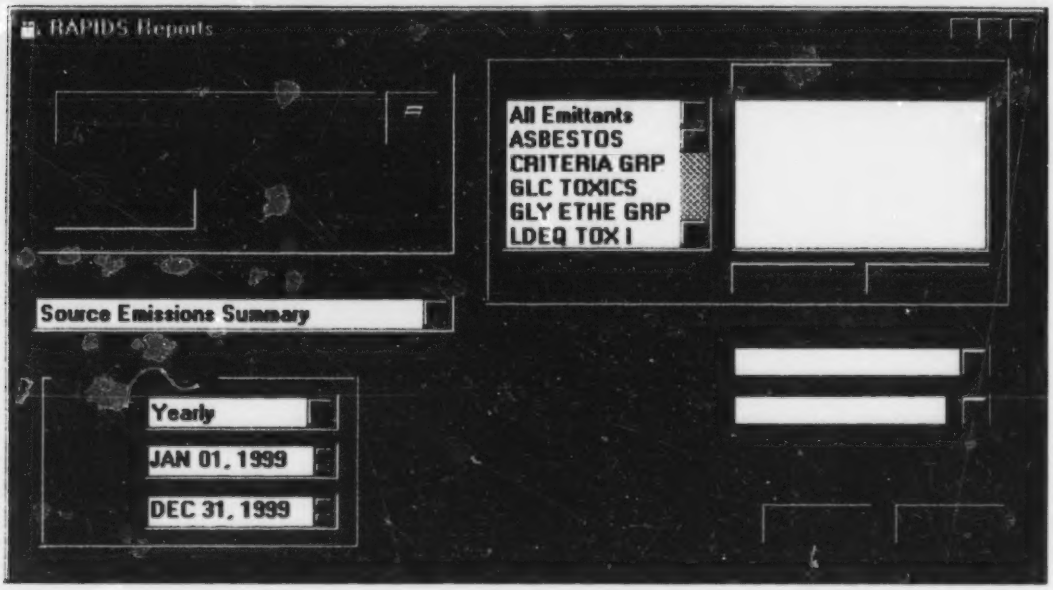
To generate a report for the Fictitious Coal Burning Facility which is located in the Athabasca County of Alberta in Canada open the presented tree diagram to show companies located in Athabasca County. Select the FCBF source by clicking with the RIGHT mouse button (not the LEFT as is usual) in the box beside the FCBF source.

The screen should appear as follows.

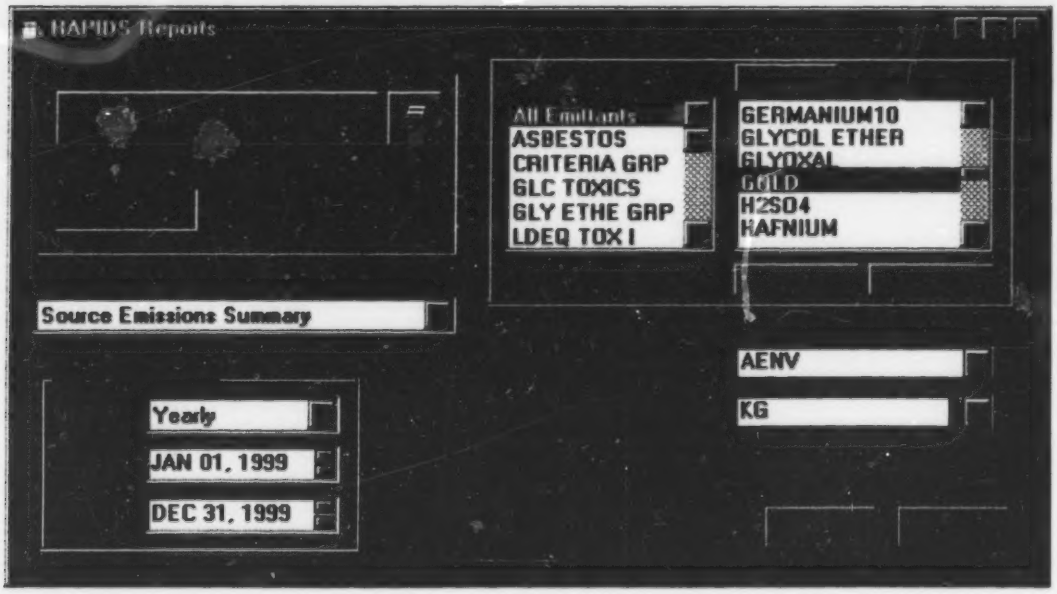


Select OK to return to the Reports Screen.

Select the Source Emissions Summary from the list of available reports, and identify the Emission Period as being from JAN 01, 1999 to DEC 31, 1999. The screen should appear as.



Select All Emittants from the list of Material Groups and click on the Emittants button. In the list of displayed Emittants select GOLD. Select AENV from the list of Reference Codes and KG from the list of Units of Measure. The screen should appear as follows.

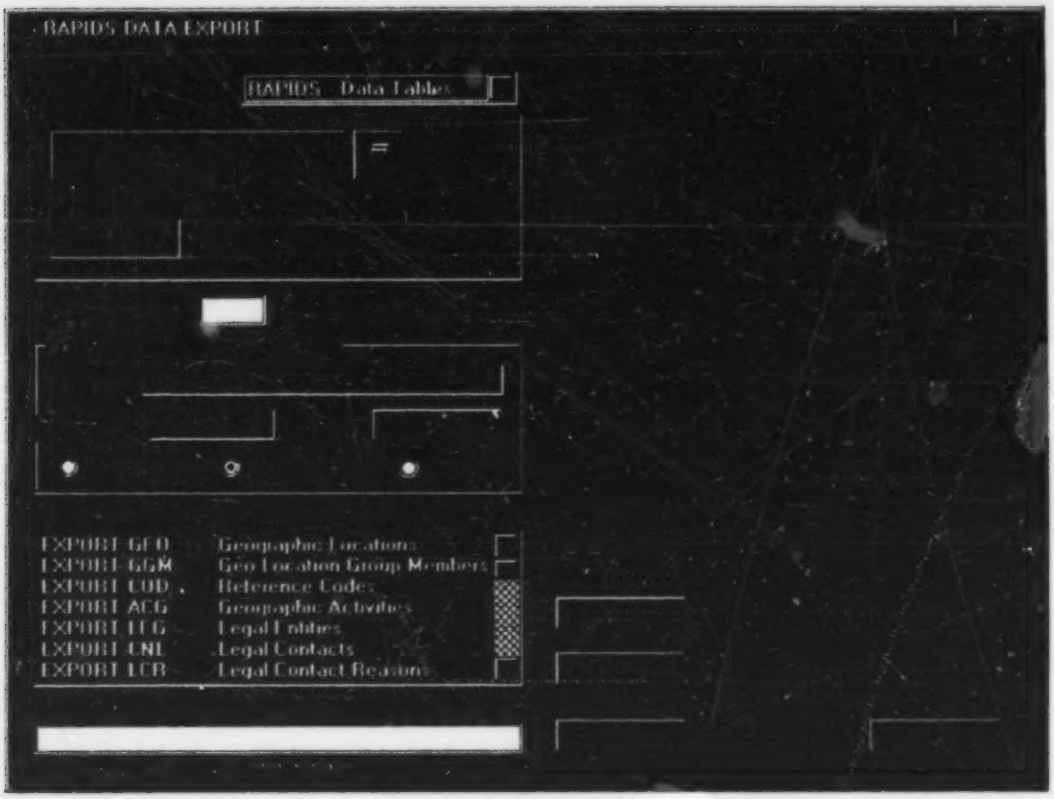


Click the Preview button to show the report, and then Exit to exit the Report screen.

10.2 Extracting Data Files

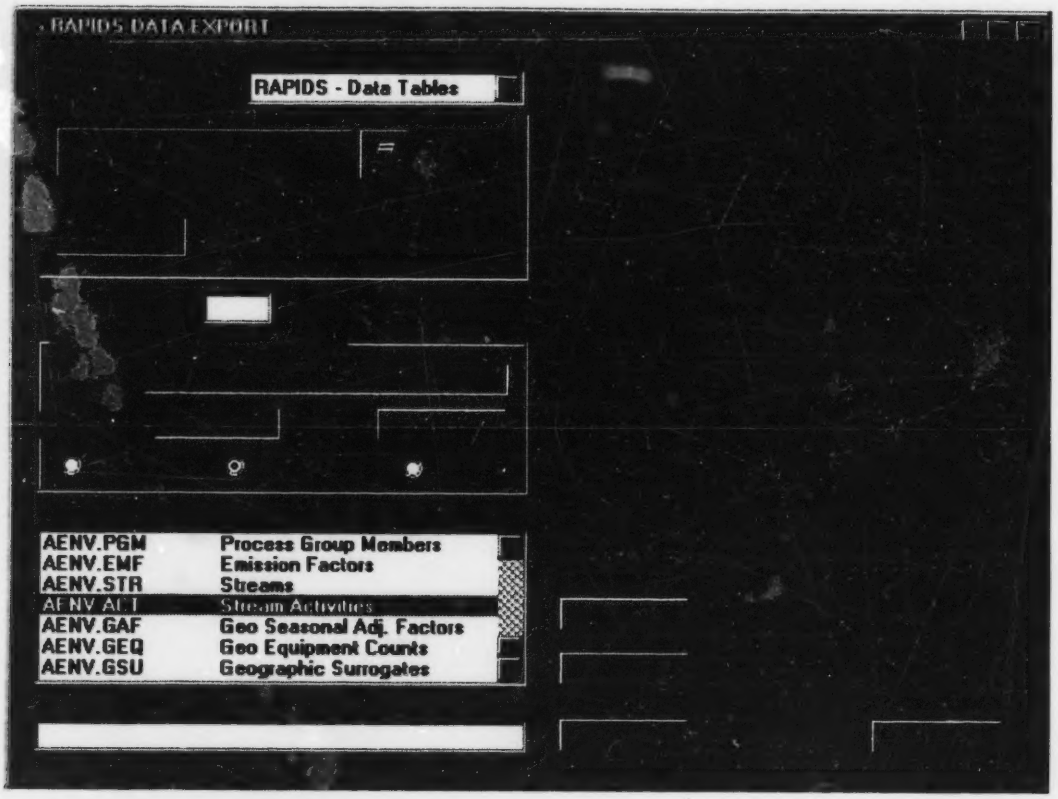
The following section describes specifically how to generate a data extract containing information on emission discharges for submission to another database.

Under the file menu select the Export tab and select RAPIDS Import File Format, the following screen will appear.

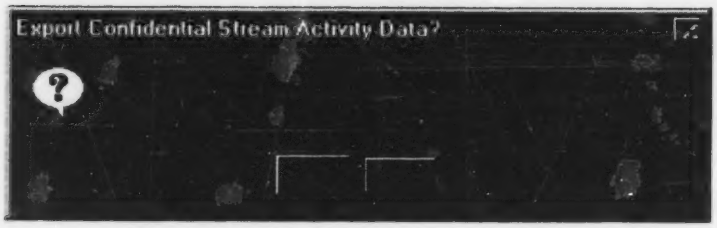

RAPIDS DATA EXPORT
RAPIDS Data Tables
EXPORT GEO Geographic Locations
EXPORT GGM Geo Location Group Members
EXPORT COD Reference Codes
EXPORT ACG Geographic Activities
EXPORT LEG Legal Entities
EXPORT CNL Legal Contacts
EXPORT LCR Legal Contact Reasons

Click on the Source Selector button to select (as was done for generating the report in the previous section) the FCBF source. Select a directory for the generated file by clicking on the Select button beside the File Name box. Select AENV as the name of the file.

Click the Removal All button and scroll through the list of Files to Export and select the AENV.ACT file. The screen should appear as follows.



Click the Export button to generate the export file. You will be prompted to pick whether or not confidential information should be extracted.



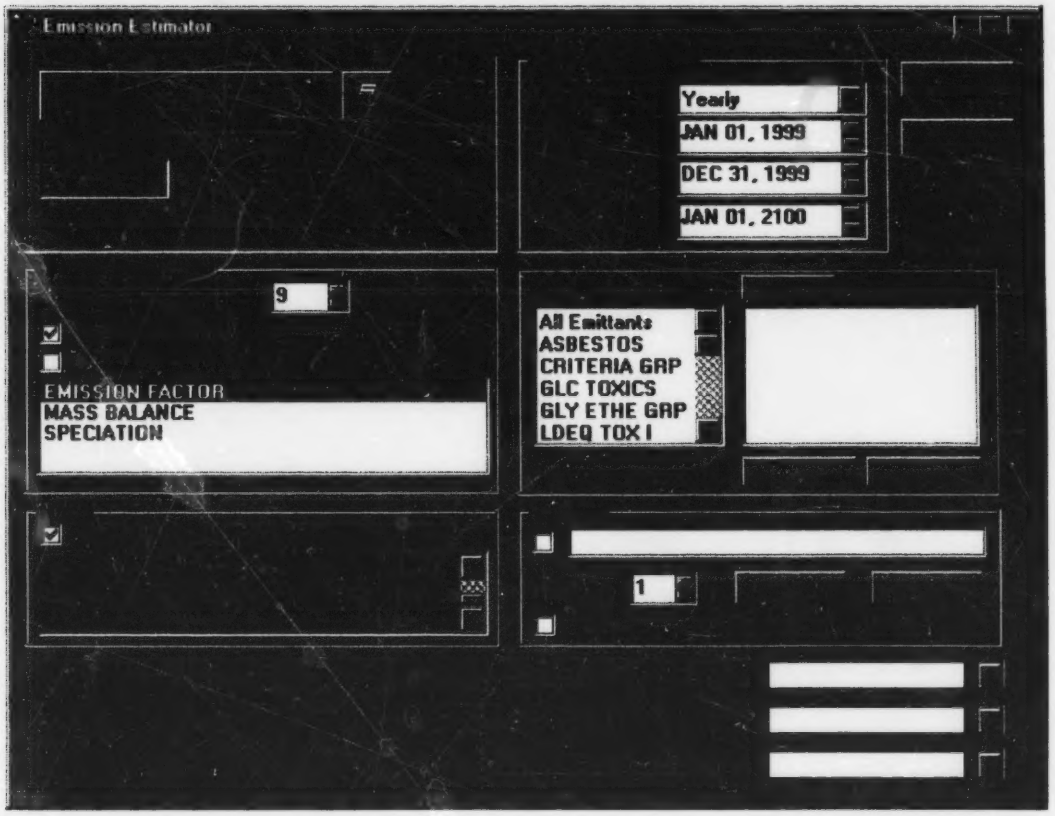
Because the Emission information entered for this facility was not marked as confidential, all data currently entered will be extracted.

Click on the Exit button to exit from the data export screen.

The file AENV.ACT contain the extracted information, this file can be imported into another RAPIDS database that has a matching description of the facility.

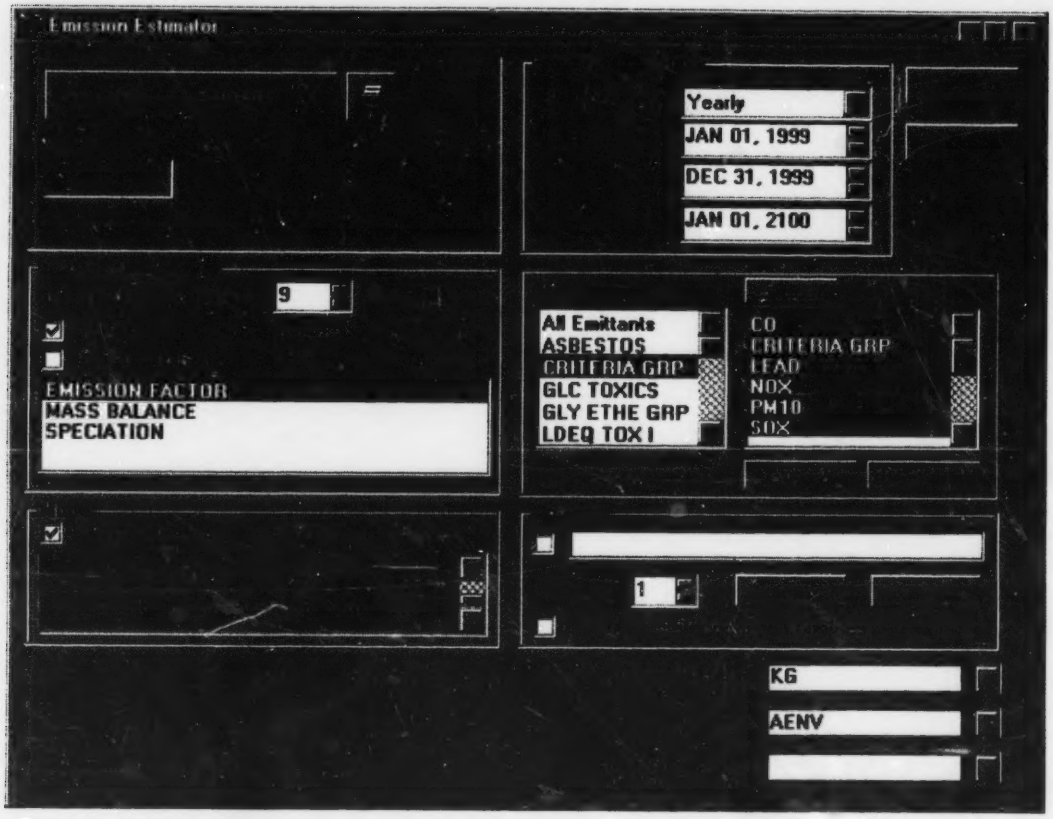
EMISSION ESTIMATION

RAPIDS can estimate emissions through the use of emission and speciation factors. To access the emission estimator, select Emission Estimator from the Calculate menu. You will immediately be required to identify which source/sources you wish to calculate emissions for. Select the FCBF facility, and the following screen will appear.



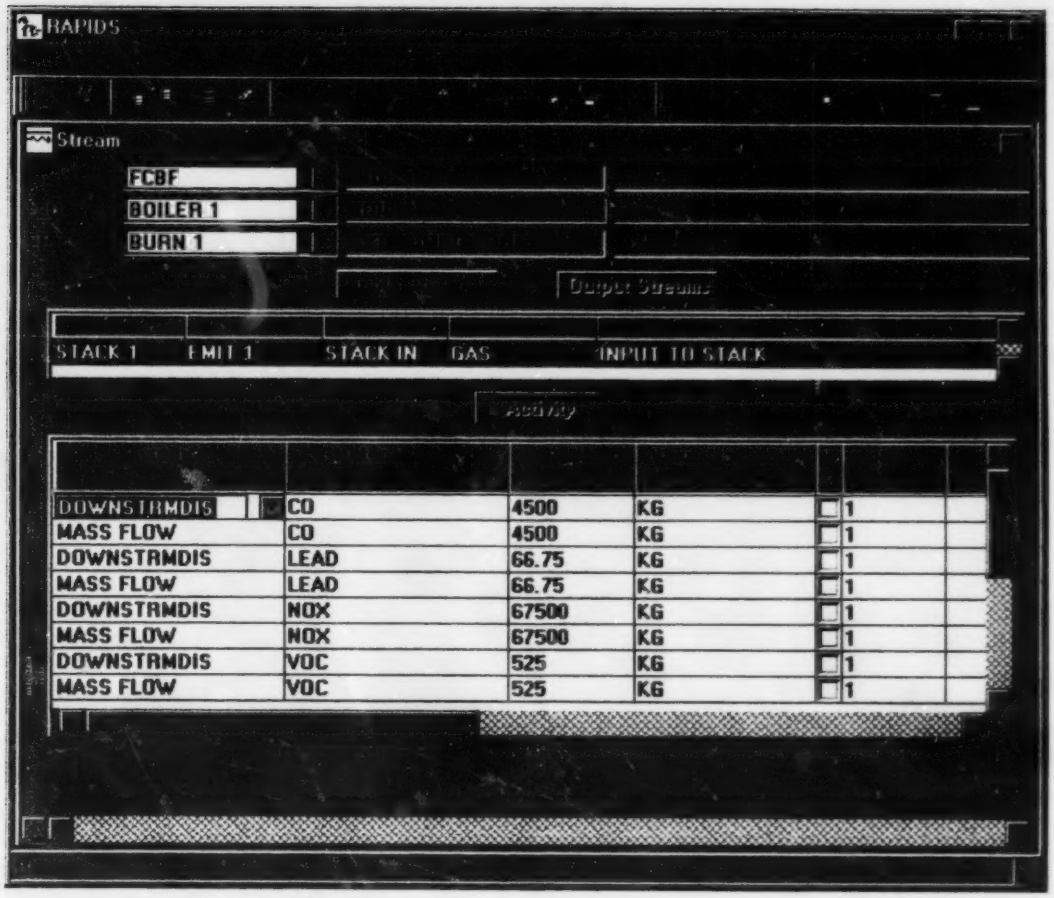
Make sure that the Calculation period dates are entered as shown. Select CRITERIA GRP from the Material Groups and click on the Emittants button. Click the Add All button. Select KG as the Unit of Measure and AENV for the Reference Code.

The screen should appear as follows.



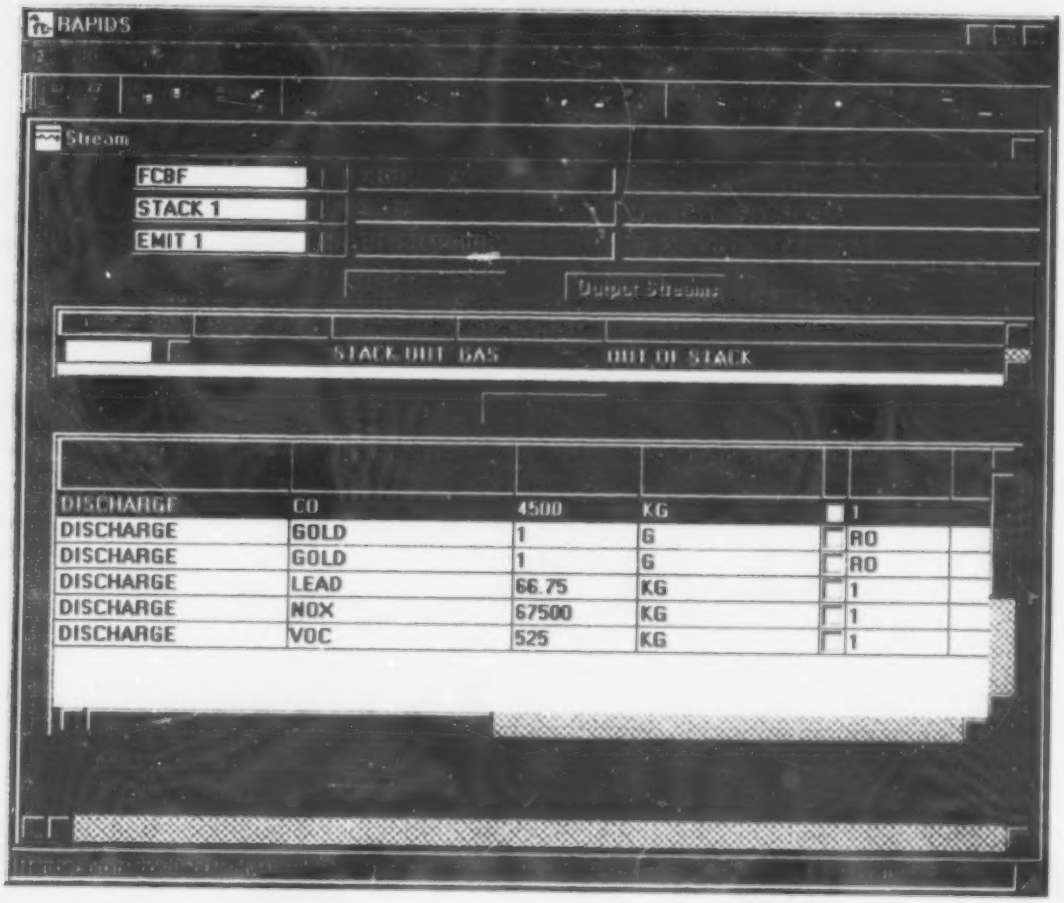
Click on the Calculate button, you will be prompted to open a log file. Select a location for the log file and identify the name for the file, when you click the Save button on the file dialog box, the emission estimator will commence. Exit the Emission Estimator, and return to the RAPIDS screen for Streams, or run a report to review the calculated emissions.

From the RAPIDS data menu select Stream. Select the FCBF Source, the BOILER 1 Device and the BURN 1 Process. Select the Output Stream associated with this process, and click the Activity button. Under the view menu select the Tabular option. The screen should appear as follows.



Notice that DOWNSTRDIS (Downstream Discharge) and MASS FLOW are identified for the different criteria contaminants. The MASS FLOW value identifies the actual mass of emittant transferred through this stream over the time period identified. The downstream discharge indicates the amount that actually gets released to the environment should a sequence of control devices reduce the quantity.

Double Click on the STACK 1 row in the stream block and RAPIDS will display the next output stream in the sequence.



Because this stream is the outflow to the environment the Metric identifies the information to be a DISCHARGE. Notice that the criteria contaminants are lists as well as the information on GOLD discharges that were previously entered.

APPENDIX II: QUESTIONNAIRE AND CONSOLIDATED INDUSTRY FEEDBACK

RAPIDS Pilot Project Questionnaire

Context of this Questionnaire

One of the principles that guide Alberta Environment is to be leaders in innovation to improve the decision process that affects the management and protection of the environment. In response to these drivers and principles, a modern system for creating and maintaining an inventory of air emissions from regulated industries in Alberta is sought.

An emission inventory can be thought of as a comprehensive, accurate, and current accounting of air pollutant emissions and related information from sources within a given area over a specified time period. As well as emission data, a well-structured inventory will include source details and monitoring results, process and production information, pollution control equipment details, and relevant compliance information that together allow the regulatory agency to determine the present and projected effects of emissions on air quality. Emission Inventories are essential for:

- ensuring compliance with individual approvals (operating permits);
- addressing zonal/regional air management issues;
- determining the overall magnitude and trends of emissions;
- performing sector specific emission evaluations;
- addressing local air quality issues and problems; and
- fulfilling Domestic and International Obligations and developing provincial positions on these initiatives.

Emission Inventories are information intensive, requiring detailed knowledge of industrial processes, production levels and control technologies. They are best assembled through a collaborative effort that draws together information from people familiar with each specific source. Common methodologies for estimating emissions are critical so that results are comparable between facilities and between jurisdictions.

The Regional Air Pollutant Inventory Development System (RAPIDS) pilot project is to evaluate:

1. How Alberta Environment can adapt and use an existing software package to store and manage air emissions information.

2. How Industry can use this software package to collect, and manage their air emissions information.

3. How this information can be transferred between industry and government.

The system being evaluated is based upon the Regional Air Pollutant Inventory Development System (RAPIDS). RAPIDS is the principle component of the Great Lakes Regional Air Toxic Emissions Inventory project.

This questionnaire is intended to solicit feedback from the industry participants following the workshop, after the participants have had a chance to further evaluate RAPIDS. The questionnaire is divided into four parts. The first part is concerned with the general process for revising and updating the Air Monitoring Directive. The second part solicits feedback towards improving and streamlining the process by which industry and government transmit and share information. The third part focuses on the RAPIDS application software, and solicits information on its applicability and usability. The fourth part of the questionnaire solicits information on the current technical environment in order to identify mechanisms and systems that are suitable for facilitating information exchange. Part 5 is intended for your general comments and suggestions.

For these questions, you may want to revisit the handouts of the presentation made during the December 2nd, 1999 workshop, or the RAPIDS user manuals. When answering, please insert your responses directly after the question. If you are using Microsoft Word, you may wish to use the "Highlight Changes" feature under Tools, Track Changes.

Should you have require clarification about this questionnaire, please phone or email:

David Slubik
Emission Inventory Specialist
Science & Technology Branch
Alberta Environment
4th Floor, Oxbridge Place
9820-106 Street
Edmonton, AB T6L 6Y3
Phone: 780-427-7022
Fax: 780-422-4192
mailto:dave.slubik@gov.ab.ca

1. Revising the Air Monitoring Directive (Air Reporting Directive)

It is Alberta Environment's intention to use RAPIDS as the central repository for emission related information. The interface to this system for you may be a copy of the RAPIDS interface installed at your site, your own environmental management system, or some simpler methods that we develop during the pilot project. The RAPIDS project will be focused on industrial processes, emission estimation, and reporting of this information.

This pilot project is being carried out in conjunction with the update to the Air Monitoring Directive (AMD), with the intent to move from a paper to an electronic-based reporting system. As RAPIDS is primarily intended for emissions related information, this project will focus on that area. Similar efforts within the Environmental Service of Alberta Environment are focussing on ambient air quality and other information that is currently handled separately from air emission data.

General Questions

1.1 In what manner would you like to continue to be involved in the development of this system and the overall revision of the AMD?

R.1 Dow Chemical would like to continue to be involved in the development of any electronic reporting and revision of the AMD.

R.2 As a representative of an industry association, we are interested in how this, and other developments, will affect and streamline the way we are doing business. In this context I would be interested in participating on the development of the AMD and RAPID systems. If project, or pilot projects are needed to try out the system we can solicit our membership to see if there are interested parties.

R.3 I would like to stay intimately involved with the process.

R.4 The site would like to be involved in the discussions / review of RAPIDS development and AMD revisions.

R.5 Personally my involvement should come to an end. We are in the process of re-organizing our department. There will be a new Environmental Services Regulatory Air contact for Syncrude. I will pass this on to the new person with my recommendation that Syncrude continue with input into the revision of the AMD.

R.6 ATCO Electric would like to be involved in any changes to the reporting system or AMD. Representation on steering committees, work groups or discussion groups would be of interest.

R.7 NOVA Chemicals would like to continue to participate in the RAPIDS Project and would like to be an active participant in the revision of the AMD.

R.8 *Dave Lye from the Calgary office will be sitting on the steering committee for the revision of the AMD. In regards to RAPIDS Shelly Glass attended the RAPIDS information session in Edmonton and AEC would be interested in participating in a RAPIDS pilot project if it proceeds. Adele Tait will assist with the implementation of the pilot program at licensed facilities.*

1.2 Based on the compliance and emission inventory needs highlighted during the December 2nd workshop, do you see the value in a tool such as RAPIDS, either for managing and submitting your data, or for Alberta Environment maintaining a central repository?

R.1 *It is agreed that there is value and a need for electronic submission and management of data by Alberta Environment. However, RAPIDS does not appear to be the best tool for this task.*

R.2 *Given the large qualities of data that must be collected and submitted to Alberta Environment, and other agencies (such as the NPRI and VCR programs) and electronic method of gathering and reporting emission information would be a very valuable tool.*

R.3 *I think that the RAPIDS has some value BUT it is not a perfect tool. It does not capture stack test data, or even CEMS data very well.*

R.4 *It is agreed that there is value in having a central repository for emission inventory data. This would assist both industry and government in assessing / understanding regional air sheds. Furthermore, there is benefit in a more efficient reporting interface. However, the transition must be possible with minimal resources for industry. Based on the RAPIDS seminar in December, it is believed that RAPIDS may not work for all sites and reported data.*

R.5 *I see the value of a standardised method of electronic reporting of air emissions from Alberta sources to a central repository. It would be helpful if the program/system used for reporting was also commonly used in the average workplace.*

R.6 *Value seen as an emission inventory, but not as a tool for compliance.*

R.7 *NOVA Chemicals supports the development and implementation of quality checked electronic data reporting but it remains to be seen how the RAPIDS software would benefit us.*

R.8 *I see the value in a central repository for Alberta Environment for an emissions inventory however, we currently have extensive programs in place at our approved facilities for managing and submitting our data. Currently we submit ambient air monitoring data to Alberta Environment on a monthly and annual basis, since we do not have a region airshed zone formed in this area, and it was*

my understanding from the workshop that RAPIDS would not be able to satisfy this requirement. Dual reporting requirements would be a concern since we are required to submit ambient air data in our monthly reports.

1.3 During the workshop a summary of emission inventories, how they are compiled, and how they are used was given. Was this summary useful? Do you see the usefulness in these emission inventories?

R.1 With respect to regional or zonal inventories, this summary may be useful for new projects or evaluation of airsheds.

R.2 Overall, we can see how emission inventories would be a good tool for helping manage environmental issues on a regional, or air shed, scale. The question that arose in my mind after the session was how do we gather this information. Is it through emission estimates or through actual monitoring? We fully understand that actual monitoring will be required for legal and compliance purposes.

R.3 It is always useful to understand the needs and background of any project.

R.4 Yes, there is benefit in emission inventories.

R.5 I can see that Government and non-Government environmental would find a common provincial emission inventory useful. Industries are probably more concerned with regional emissions data.

R.6 Emission inventories can be useful but it is important that the database is accurate and complete.

R.7 NOVA Chemicals creates our own emissions inventory using source emission testing, process data and emission estimation methods. There were no updates in the summary of emission inventories to what we are currently doing. We certainly believe in the value of emission inventories.

R.8 I definitely see the usefulness for many areas (government, industry, etc.) in an accurate emissions inventory. It is very useful to get the big picture and to see what our facilities contribute to it.

1.4 Although many of the data elements necessary to compile comprehensive emission inventories for Alberta are already present in our current compliance system, some changes are necessary. Some of these changes, as noted during the workshop presentation, would be to standardize data elements across the various industries. For instance, some facilities and industries are required to substantiate current emission estimations from CEMS or production data, others are not. Should Alberta Environment set

emission inventory report limits (ie, 100 tonnes per year) at which each operator must submit a complete inventory statement? At this time, the AMD only has reporting limits for SO_2 and NOx, and the data required to substantiate the estimates is minimal.

R.1 *It is agreed that standardization of data elements would be an improvement.*

R.2 *This is a tough question to answer. If the question is "do we set a limit beyond which companies would be required to submit a "complete inventory' then I would say "most definitely". For smaller operators, or even larger operators who may be having an insignificant effect on the environment, the workload required to submit a complete inventory would be inappropriate. The only precaution I have here is that, in many cases, the major source of contaminants within an air shed is from non-point sources or lots of minor point sources. If a limit is set, then there should be assurance that these other sources are taken into account.*

R.3 *Personally, (ie – not to be confused with the company's position), I don't see any reason why you shouldn't be receiving this information. It is already being done for NPRI. I would not want to do monthly or quarterly updates on this information though. I don't see any value in anything greater than an annual update UNLESS there is a CEMS attached to the source. Otherwise the reporting and estimating becomes a very onerous task.*

R.4 *do not understand the question*

R.5 *The determination on what gets reported should be based on location, regional loadings, applicable standards and emission amounts. The AMD should focus on the common emissions of concern like SO2 and NOx. Other emissions are best handled through other systems such as the NPRI.*

R.6 *This information is currently prepared and submitted. NPRI reports are also submitted. If data is to be used for inventories, it must contain all sources.*

R.7 *NOVA Chemicals will follow whatever guidelines AENV decides are appropriate.*

R.8 *It would depend if the emission sources would include the SO2 emissions from the flare. A yearly cap on emissions rates could be calculated based on the approved daily SO_2 incinerator limit however, that value does not include SO2 tonnage from flaring. Having a cap on certain sources maybe a conflict with safety measures and other governing bodies such as the EUB. Prior to committing to an emission inventory it would be useful to know what parameters are to be included and what primary sources are to be monitored. For companies who are not required to submit CEMS data I think an emission inventory report limit for SO2 would be beneficial.*

1.5 Alberta Environment and Environment Canada conduct various emission estimation studies, we often estimate pollutant releases for given facilities or for industry sectors. These estimates could be for various pollutants, including criteria, air toxic, and greenhouse gas emissions. If in question 1.3 you do not see the usefulness in emission inventories, or in supplying information for them, would you accept emission estimates made for you by Alberta Environment or other government agencies? Would you rather participate in these studies or programs? If so, to what extent?

R.1 Dow would prefer to participate in the studies and provide actual data rather than have emission estimates provided for us.

R.2 The problem with emission estimates that are "made for you" by regulatory agencies is that sometimes they do not represent the real situation. This can lead to erroneous decisions being made on how to control a potential problem. This, turn, can lead to significant resources being spent with no corresponding change to environmental quality. If companies do not participate in emission inventories, then participation in government study on emission factors would be essential.

R.3 I think the inventories are a necessity. I have a problem with estimates because I think they tend to underestimate emissions. If we are going to rely on estimates, I think AEnv needs to define the methodology and verification protocols.

R.4 Participation in an "emission estimate study or program" would be the chosen option. It is not desired that an emission estimate for the site be completed without direct involvement.

R.5 We participate in numerous regional groups that look at concern issues. If AENV wishes to estimate emissions other than those we calculate ourselves through the regional groups then they should be free to do so. It must be noted that these estimates are not validated by the industry though.

R.6 We would like to be involved in the preparation of emissions inventories. Even when emission factors are used, our experience in utility operation would be beneficial in determining accuracy.

R.7 NOVA Chemicals prefers to supply their own site-specific data. We actively look for opportunities to participate in these studies and programs.

R.8 Our preference is to provide accurate information on emissions rather than have estimations made for us. We currently provide monthly air emissions reports to Alberta Environment as well as annual air emissions reports, including NPRI. I am not to sure to what extent Alberta Environment is referring to. What type of additional reporting does this include?

2.0 Information Interchange

The driving goals are to streamline the process whereby industry reports information, and to improve the quality of information. The information involved is specific to individual sources, but often is based on estimation techniques rather than direct measure. Because emission information is used as the basis of agreements between jurisdictions at the national and international level, it is important that common methodologies are employed that can be openly justified.

Centralized Repository of Information

2.1 Should there be a centralized point where information about a given source is maintained, and the values agreed to and accepted by the facility and government agencies?

R.1 No opinion.

R.2 Yes. This is currently the case where monitoring information is submitted to Alberta Environment in a paper form. AENV then becomes the central repository for this information. In the future this concept needs to be maintained.

R.3 Absolutely (see previous question's answer).

R.4 Do not necessarily agree that there is a need for a centralized point where information about a given source maintained. Given the effort required to build the database and confirm data, what is the benefit to industry? Please note that this type of information has been previously submitted to Alberta Environment in Approval Applications.

R.5 Yes for pertinent emissions.

R.6 Either a centralized point or a single database.

R.7 Yes

R.8 We use our data capture system to meet various needs not all of these are information that is provided to Alberta Environment. For example we use the same system at our facilities for the monthly Alberta Environment reports and the Energy & Utilities Board S-30 reports. Would this centralized system satisfy the EUB reporting requirements as well.

Common System Approach

2.2 Should a common system be adopted that government and industry can both use to develop and maintain emission information, and to ensure consistency of methodologies?

R.1 It is agreed that a common system for data collection/storage would be a good idea; however many companies, such as Dow, may have their calculation methodology dictated by a global head office. Therefore any Alberta requirement for calculation methodology could possibly mean recalculating everything a second time.

R.2 Yes.

R.3 Absolutely

R.4 Current emission estimations are based on good engineering and technical knowledge. Therefore, some choice should be given to the facilities as to the method used. It is understood that methods used must be already consistent with requirements for NPRI and hence these criteria should be met.

R.5 Sounds like a good idea.

R.6 Yes, if CEMS data is not being used.

R.7 Yes

R.8 This would be difficult to achieve since there are various systems used throughout the various industries to capture and report emissions data. We have three approved facilities in my direct area alone and each of them uses a different system for data capture and reporting. Not only are the data capturing systems different but, the manner in which the data is represented also varies from approval to approval. This would require significant change throughout industry and only minimal change for the government. I also have a concern that in implementing this particular database program industry would be limited to only that supplier, and that it would seriously affect other organizations that have been providing these services thus far. Our preference is to support local business'. Local solutions mean local support. If we are to use one common solution across industry this does not allow us to differentiate, innovate or otherwise improve our business processes. We would like to implement forwarding and electronic copy to AENV for there use and then it could be implemented into to the RAPIDS database in house.

Data Confidentiality

2.3 What levels of confidentiality should be maintained on emission information?

R.1 *None – most, if not all our emission data is currently public info.*

R.2 *Emission information, as currently legally required, will become public information anyway. The only concern regarding confidentiality would be that a proper QA/QC program be in place to prevent data that may have errors from falling into the hands of the public.*

R.3 *Production data must be confidential. All other data must be considered against the FOIP criteria.*

R.4 *Submitted data and information are confidential and any disclosure of the same is governed by the provisions of each of the applicable provincial or territorial Freedom of Information legislation, the Privacy Act (Canada) 1980-81-82-83, c.111, Sch. II "1", and the Access to Information Act (Canada) 1980-81-82-83, c.111, Sch.I "1", as such legislation may be amended or replaced from time to time*

R.5 *- - -*

R.6 *Information submitted in monthly reports is public information.*

R.7 *No comment at this time (we need to consider this question).*

R.8 *There is specific information such as production information, equipment information within the plants that is confidential information.*

2.4 What Parameters should be confidential?

R.1 *Any production data – this is usually for competitive reasons.*

R.2 *Production information and "up time" are two items that should be kept confidential.*

R.3 *See answer above.*

R.4 *All submitted parameters must be deemed confidential.*

R.5 *- - -*

R.6 *No opinion.*

R.7 *No comment at this time (we need to consider this question).*

R.8 Any information regarding the above listed points.

2.5 Do you foresee any legal difficulties in switching from a paper based submission of compliance data to an electronic based one?

R.1 No.

R.2 The only difficulty I foresee is the need to have a process verify back to the submitter that the information has been received.

R.3 You may want to have some form of electronic signature. I would like to see a submission # for my records to confirm the information was transferred on time. I think that an electronic transfer of data should be as legally binding as a paper system BUT I'm not a lawyer.

R.4 This question was not researched but problems are not foreseen if submission is consistent with NPRI reporting.

R.5 - - -

R.6 Not all information can be submitted as "inventory" information.

R.7 No. A component that should be considered under this change would be that the submitting company should retain a hard copy of their submission and back-up documentation for reference and for auditing purposes.

R.8 This would require adjustment with any information that is being provided by third party sources. Within a reasonable adjustment period and with an agreement from the Alberta Environment Approvals Division it should not be such a problem. We provide approval violation reports within seven days of a violation these are typically provided via paper copy. We also submit these again with the monthly report. These would be things that would require discussion with AENV Approvals Division. Ultimately a paper copy or back up copy would be ideal.

Standard Summaries and Reports

2.6 Should a standardized set of summaries and reports be developed which present information in a context that supports the regulatory decision process, and that provide the context against which individual facilities can base their own assessments?

R.1 Agree

R.2 *We have to be careful here that these standardized summaries are flexible enough to meet the needs and unique situations that some facilities are in.*

R.3 *Yes – this information will be useful in helping us determine where we are relative to other industry (within and without our own sector). This information would be a driving force for our environmental improvement programs and initiatives.*

R.4 *Do not understand the question. Are standardized summaries and reports not already required for EIAs?*

R.5 *Industries belonging to specific groups should have standardized emission summaries. It may not make sense to have standard emission summaries for different industry types*

R.6 *Yes*

R.7 *Yes*

R.8 *Yes*

2.7 Where applicable, should the base of emission inventory information used in standard reports and summaries be extended to include other sources such as area and mobile? i.e., should other sources of atmospheric emissions be included in the same database, so that your emissions can be more easily seen in full context?

R.1 *No concerns with such a proposal.*

R.2 *ABSOLUTELY CRITICAL!!!! In a lot of the situations I have been involved in, the non-point sources are the major source of pollutants. By ignoring these sources, the public and decision-makers think that the problems are only caused by industry.*

R.3 *Yes – information without the appropriate context can be very misleading. I need to see the whole picture, not just a piece of the puzzle.*

R.4 *Yes*

R.5 *Where it makes sense other sources such as mobile should be part of the inventory*

R.6 *Yes*

R.7 *Yes*

R.8 *I am not to clear on exactly what this would entail however in order to obtain a representative emissions inventory all sources should be looked at and included.*

3 RAPIDS usability

This section solicits feedback on RAPIDS to determine whether or not it can serve as a common system to streamline the process of gathering, maintaining, and reporting information pertaining to emissions from industrial facilities.

Suitability as Emission Estimation submission of Compliance Data

3.1 From your experience during the workshop, and any subsequent use, do you find RAPIDS to be suitable, or useful as an emissions estimation tool?

R.1 *No. RAPIDS showed no useful capabilities to Dow Chemical.*

R.2 *We have to be careful here to be clear on what we want. It was our initial understanding that the RAPIDS program was to be used as a method to submit, and compile "emission monitoring" information. The goal here being that the administrative workload on all parties would be diminished if this data could be submitted, and compiled electronically. After the workshop it was apparent that the RAPIDS model is "designed" to be an emission estimation system. With these points in mind, I do not feel that the RAPIDS system is a good method for the electronic submission of monitoring information. As an estimation tool, it may have some usefulness.*

R.3 *I see some value in using RAPIDS BUT I would like to see a tool that collects NPRI estimates, CEMS data, Ambient Air data, and stack data so that we eliminate the need for other monthly reporting via the paper system.*

R.4 *Keeping in mind that this program has only been explored for a few hours, it seems suitable as an emissions estimation tool. However, a comparison to other systems for 1) user -friendliness; 2) applicability to local industry; and 3) flexibility is required. In that regard, it is hard to make an assessment when one has only been exposed to one system.*

R.5 *- - -*

R.6 *It is OK for emission inventories, but not for compliance reports.*

R.7 *As an emission estimation tool only.*

R.8 *From the brief time we worked with it, it would be an effective estimation tool. However, the program is not very user friendly.*

3.2 From your experience during the workshop, and any subsequent use, do you find RAPIDS to be suitable, or useful as a compliance data submission tool?

R.1 *No.*

R.2 *See above noted comments. As a compliance data submission tool, I found the RAPIDS model to be too complex.*

R.3 *I think RAPIDS can be used for CEMS data with a little tweeking. But it did not seem all that useful for stack data or Ambient Air data collection. From memory, I don't believe it was useful for estimating NPRI data either. These shortcomings would have to be overcome for the program to be useful from an industry point of view.*

R.4 *Based on the workshop, it is not believed that RAPIDS shall serve all needs for data submission. It seems more appropriate for reporting single calculated values rather than continuous data or frequency distribution charts. In addition, it shall not be acceptable to industry if substantial time and financial resources are required to use or set up the program.*

R.5 *It seemed like RAPIDS wanted too much information. Production data is not always tied to emission amounts. Adding in the production and process data complicates the process*

R.6 *No*

R.7 *No, NOVA has a CEMS based system and the compatibility of this software to CEMS data has not been demonstrated. There was also no demonstration of data manipulating tools which would allow the CEMS data to be rolled up into whatever format AENV desired.*

R.8 *I feel there may be some other more cost-effective options that should be researched first. However if they are not feasible the RAPIDS would be suitable.*

3.3 From your experience during the workshop, how did you find the usability of the RAPIDS interface?

R.1 *Very unfriendly software. Too complicated and cumbersome – and I am an experienced computer user!*

R.2 *My experience with the RAPIDS project is that it is a very complex program. This may create some difficulties with medium and smaller sized companies being able to understand and use the system. There may also be difficulties with larger companies entering complex data (will one wrong piece of data cause problems with the quality of the resulting information).*

R.3 *Having worked with a lot of different programs over the years, I found RAPIDS to be very user friendly. It certainly wasn't any worse than a lot of other data collection programs. Keep in mind I tend to be a bit of a computer geek though.*

R.4 *The program was relatively user-friendly although there were "quirks" with the programs. Not all aspects of the program are intuitive.*

R.5 *I found using RAPIDS cumbersome but that may change with use and getting to know the program*

R.6 *It was not overly user friendly.*

R.7 *The RAPIDS interface is overly complicated for simple data reporting. This tool would be time consuming for certain applications, as the software is not compatible to CEMS data outputs.*

R.8 *The program did not seem to be very user friendly.*

3.4 Should RAPIDS be revised to permit confidentiality of information within a common system used by both Government and Industry?

R.1 *Yes. If RAPIDS is used, then some measure of confidentiality is required.*

R.2 *Most definitely. Some of the information required for the RAPIDS model does not have to do with environmental issues, except in an indirect manner. This may result in industry production records or even process information being available to competitors.*

R.3 *Yes*

R.4 *Yes, confidentiality of information must be a part of RAPIDS.*

R.5 - - -

R.6 *Not necessary.*

R.7 *No comment at this time (we need to consider this question).*

R.8 *If RAPIDS is implemented as a common system for industry and Government it would be a nice option to have confidentiality. If this information will be provided to the public or other industry then it would be absolutely necessary to have confidentiality for certain information. What would be the security on the system? How can we ensure in the case of an electronic copy that it is not tampered (changed) with in anyway once it leaves our hands.*

3.5 What information or functionality is missing from RAPIDS?

R.1 *RAPIDS does not directly answer the question of electronic submission – which, as far as I understand things, is the primary issue. Most companies already have methodologies for calculating emissions, etc.*

R.2 *The ability to include other types of information that is not associated with inventories.*

R.3 *The ability to enter stack test data, ambient air data, and other annual estimates (ie NPRI data) seemed to me to be lacking. I'm not sure if all the CEMS data can be entered (ie temp). I would also like to enter comments regarding the performance of the plant during the reporting period (ie – downtime of CEMS or ambient air instruments, unusual events, etc). RAPIDS should completely eliminate the need for a monthly or annual paper report. I would also like to see incident information entered into a common database to ensure that we both have the same information in our records. Often I have found there are large discrepancies between the data in our records vs AEnv's with respect to incident data.*

R.4 *As suggested above, 'single value' parameters seem to be the easiest and most straight-forward to report. As such, the program seems reasonable to replace the "monthly report summary" sheets (i.e. including production data, hours above approval limits etc.) that are a part of monthly air reports. However, it was not apparent how or if RAPIDS can handle reporting of CEMS data or frequency distribution data. Again, if a program is adopted for reporting, it must require minimum or no additional resources on the part of industry.*

R.5 *If anything RAPIDS tries to do too much.*

R.6 *Summary explanations of information in logs.*

R.7 *The ability of the system to interact with CEMS data.*

R.8 *Ambient air data submissions to satisfy monthly reporting requirements. From discussions at the workshop there did not seem to be anyway to link RAPIDS to the CEMS and pull the data directly. The systems currently in place have this ability. Without this, we would be required to input this data manually. As well CEMS data is required to be reported monthly to Alberta Environment. If the system is not capable of satisfying these requirements we would be doubling our work load and increasing our costs in implementing this system.*

3.6 Are the methodologies used by RAPIDS to estimate emissions consistent with methodologies currently employed for your facility?

R.1 *Do not know.*

R.2 *No*

R.3 *- - -*

R.4 *Not Sure*

R.5 *- - -*

R.6 *Yes*

R.7 *More investigation required*

R.8 *- - -*

3.7 Would RAPIDS be useful as a "bookkeeping" tool for industry to track and maintain industrial process information?

R.1 *No. Already using other software or calculation methods*

R.2 *Most of our companies already have extensive program that maintains industrial process information. I don't think they would use the RAPIDS model for this purpose.*

R.3 *I see a lot of value in using RAPIDS as a database tool for documenting the process as it relates to the emissions for the different components of our site. I think it can be used to delineate the "aspects" as defined by ISO 14000 requirements.*

R.4 *No. This shall be very time intensive and expensive to develop. It also seems redundant based on the current NPRI database for emissions. It seems to be more logical to use the existing information from Environment Canada rather than developing a new system.*

R.5 *Possibly but not necessarily better than what we have.*

R.6 *No*

R.7 *More investigation required.*

R.8 *I am sure that in the end it would be a useful tool for industry however, we currently have programs in place for these purposes already.*

3.8 Will RAPIDS be relevant to industry as an analysis/decision support tool?

R.1 *No. Dow Chemical already has analysis and support tools in place.*

R.2 *No (see above for reasons).*

R.3 *Once in use (with the proper modifications) it will be used as a support tool for analysis and decision making as would any database of this nature. However, because we already track and trend emissions data, it would not be a step out tool.*

R.4 *No. Don't think so.*

R.5 - - -

R.6 *No*

R.7 *Unclear at this time.*

R.8 *This is a difficult question to answer without actually giving the program a try at one of the facilities.*

Data Transfer Format

3.9 Should a centralized system and service be made available so that inputting information into RAPIDS directly automates the transfer of information?

R.1 *Yes – this is simpler and will have fewer errors (than option 2.10).*

R.2 *No, I think that automatic transfer of information can cause problems (no time for QA/QC checks)*

R.3 - - -

R.4 *No*

R.5 - - -

R.6 *No*

R.7 *As long as the submitting company has the ability to QA/QC check the data prior to entry, we think this is acceptable (see other comments around filing hard copies).*

R.8 *I am not to sure that this is the answer. This would require some form of confidentiality. Also if all information that is submitted into the database is transferred to AENV then industry would not be able to utilize the RAPIDS database for any other uses and in house bookkeeping.*

3.10 Would a manual process be preferred whereby the RAPIDS import/export utility is used to generate files which are then submitted electronically?

R.1 *No*

R.2 *Yes (see above noted reasons)*

R.3 *- - -*

R.4 *Yes, as opposed to an automated system.*

R.5 *- - -*

R.6 *RAPIDS does not meet the information submission needs.*

R.7 *If this could be used as part of the QA/QC check, this would be a good idea.*

R.8 *If this program is implemented then this may be the better option. However, as I have said above some of these issues are difficult to determine without and actual pilot project to determine if this program will work and if it is suitable for the needs of the Government and Industry both.*

3.11 In lieu of using RAPIDS, would you find a simple spreadsheet format suitable, for facilities that do not require a detailed data submission?

R.1 *Yes PLEASE! This format good for sending data summaries.*

R.2 *Most definitely*

R.3 *- - -*

R.4 *An approved spreadsheet format is already used for this facility so "status quo" would be preferred over developing a new format.*

R.5 *Yes*

R.6 *Probably would be useful.*

R.7 *Yes*

R.8 *I think one of the biggest concerns here is that most if not all of the industry who report already have a system in place where we electronically collect and compile the reporting information for monthly reports and then print off a hard copy and submit that. The question is then asked why re-inventing the wheel. However, I received the impression at the workshop that it is not only the monthly report data that AENV would like to have submitted. For lack of knowing exactly what additional information AENV would like to obtain through the RAPIDS program it is difficult to say whether or not it would be easier to put that in a spreadsheet*

or a database. However, if there are any computer problems or glitches with a spreadsheet we have in house staff to fix the problems. In that type of a situation it would be both more time efficient and cost effective to use a spreadsheet.

3.12 In lieu of using RAPIDS, should only a simple ASCII Text Format be specified for electronic data transfer?

R.1 *Yes – good for sending raw data.*

R.2 *I think that most people have spread sheet capability.*

R.3 *With respect to the above 4 questions, I have no problem which ever way you go – we will adapt. I would suggest what ever works for you will work for us.*

R.4 *Don't know*

R.5 - - -

R.6 - - -

R.7 *Yes*

R.8 *A format should be decided upon based on the type and amount of information that is required to be submitted. We are prepared to be flexible.*

3.13 Can you recommend any other approaches that should be considered for transmitting information?

R.1 *Not at this time.*

R.2 - - -

R.3 *An internet based approach would be another method. I'm not sure how secure this method would be though.*

R.4 *For data desired for emission inventory analysis, perhaps a direct link to the NPRI reporting can be established. As an analogy, Federal and Provincial income tax calculations are linked through a common process. Could not a modification to the NPRI reporting be developed such that Alberta Based companies have a separate spreadsheet with links to already reported data? In this fashion, the intent would be to eliminate any redundancy in reporting. All the annual information would be available from this medium.*

R.5 *It would be nice to have a system developed based on a common program like excel or access that could be sent directly to AENV via e-mail*

R.6 Annual data submissions for inventories.

R.7 Webpage based reporting?

R.8 Yes we will submit our reports electronically and AENV can compile them as they see fit. I feel we should possibly do some trial and error pilot projects and start with the path of least resistance. Possible by trying to implement electronic monthly report submissions. Then, when everyone is able to satisfy that requirement we could look at a standard form for submission. We could also try to identify what additional information AENV is requiring (ie. NPRI data) and work that in to the standard form for submission, etc. These are just some examples but, the point is that there may be a simpler way to reach the end point that is desired. One thing that I feel is necessary is to include other Government organizations in this project. We already submit the majority of the information that AENV is looking to obtain to other Government organizations. Submitting the same data twice or three times in different forms requires a great deal of time and energy that could be better utilized. Also to train industry to become proficient in the RAPIDS software may be difficult. If AENV would accept data in a spreadsheet format and compile the data into a central data base that would be the easiest and most cost effective approach.

4. Technical Infrastructure

This section solicits information towards identifying if and how a common system can be used to streamline and automate the flow of information between government and industry. The intent is to determine the level of technical infrastructure that is currently available, and how systems can potentially be connected to deliver functionality to both government and industry.

R.2 *Please note: This section was not filled out because, as an association, we do not operate a facility.*

Monitoring Infrastructure

4.1 Do you monitor stack emissions and ambient air quality at your facilities?

R.1 *Yes*

R.3 *Yes*

R.4 *Yes*

R.5 *Yes*

R.6 *Yes*

R.7 *NOVA Chemicals monitors both stack emissions and ambient air quality at the Joffre site*

R.8 *Yes we monitor stack emissions and ambient air quality at a number of our facilities.*

4.2. What types of dataloggers (make and model) are employed to gather information?

R.1 *ICIS 3 – data acquisition system for ambient air*
MOD V for CEMS – soon changing to ICIS or EMC

R.3 *Ambient Air – ESC 8816 / CEMS – Honeywell process history database(PHD)*

R.4 *The datalogger for the CEMS is an Integrated Control and Instrumentation System (ICIS) data acquisition system and control hardware nodes supplied by WTC Engineering in Montana.*

R.5 *USI (model no. 1000) for flow ; USI (model no. 500C) for opacity; Bovar (model no. 920) for SO2*

R.6 *Bailey Net90*

R.7 *Campbell Scientific CR23X and Campbell Scientific CR21X*

R.8 *CEMS Bovar Model 910 at the facilities. We have continuos ambient emissions monitoring trailers, and ambient static monitoring. (bird boxes)*

4.3 What system(s) is/are used to collect and manage this information?

R.1 *ICIS 3 – data acquisition system for ambient air*
MOD V for CEMS – soon changing to ICIS or EMC

R.3 *E-DAS is used to remotely download ambient air data. The Honeywell PHD system captures CEMS and other process related data.*

R.4 *The software for the CEMS consists of a Data Monitoring and Control System to provide interface between the PC and ICIS plus a Data Handling and Reporting System.*

R.5 *We are using two systems to collect and mange this information. We have a dedicated monitoring and data acquisition system consisting of a PLC and PCs running Intellution's FIX software. This system is used to monitor and maintain the analyzers. The data from the CSEM data acquisition system is transferred to Syncrude site-wide integrated process information database, which is based on OSI Software's PI System, for permanent storage. All reports are generated from the data stored in the PI System.*

R.6 *Central Process Computer Bailey Net90*

R.7 *The ambient air analyzers are connected to a CR21X datalogger and a PLC interface. All data is sent from the analyzer to the PLC interface where it is then sent via radio link to our SCADA system. The SCADA system has a process historian and allows for alarming. This system allows real time data to be viewed from any computer that has access to our site systems. Custom built webpage reporting software allows reports (e.g. AE monthly ambient air reports) to be generated automatically. For our CEMS system gas measurement data from the analyzers are transmitted through a General Electric PLC system controller to the Data Acquisition System. The PLC system controller sequences events, provides alarm logic and analog signal conditioning, and controls other functions as necessary. Data is collected and stored on an IBM compatible personal computer-based DAS in the COGEN control room.*

R.8 *At one facility information is stored in VAX in a program called data historian. At Glance pulls the information form the VAX into either an access database program or an excel spreadsheet. At another facility information is stored in PI in a data historian and this information is pulled into excel spreadsheets. At remote facilities information is sent to Calgary and the reports are compiled from there.*

Support Infrastructure

4.4 Is staff specifically assigned to support corporate information systems?

R.1 *Yes*

R.3 *Yes*

R.4 *Yes, internal information systems support staff (local and corporate).*

R.5 *Yes*

R.6 *Yes*

R.7 *Yes*

R.8 *We have support IT staff in the Calgary office and in the Grande Prairie office. However, the support staff from either of the above offices, travel to the facilities for support services. The plants do not have IT support staff on site at all times.*

4.5 Is staff specifically assigned to support monitoring systems?

R.1 *Yes*

R.3 *Yes*

R.4 *The monitoring system is supported by Instrumentation / Analyzer Technicians, site information systems staff (minimal) and hardware / software supplier.*

R.5 *Yes*

R.6 *In Some Cases*

R.7 *Yes*

R.8 *We have Environment Health and Safety department based out of Calgary and Grande Prairie that provide support to the areas and performing all reporting requirements. We have E/I staff at the facilities who maintain the monitoring equipment. We have third party contractors who maintain and monitor our air trailers and static monitors.*

Technical Infrastructure

4.6 What make and model of computers are typically available?

R.1 *IBM Compatibles*

R.3 *Pentium 2 (300mhz minimum)*

R.4 *Currently, Dell Pentiums.*

R.5 *Pentium processors machines ranging form P133-PIII500*

R.6 *Pentium I, II and III*

R.7 *Variety of personal computing systems connected to central servers.*

R.8 *Compaq Deskpro 2000 5200MMX (Pentium II @ 200MHz) or Higher*

4.7 Which operating systems are currently supported?

R.1 *Windows 98*

R.3 *Windows 95 (moving to Windows & Office 2000); Novel network system*

R.4 *Windows 95 / Windows NT*

R.5 *Pentium processors machines ranging form P133-PIII500*

R.6 *NT*

R.7 *Windows 95*

R.8 *Windows NT4.0 SP5, Migrating to Windows 2000 with new Hardware.*

4.8 Are computers linked through a network?

R.1 *No – not the data acquisition computers*

R.3 *Yes*

R.4 *Site computers are LAN connected but the CEMS is a stand-alone.*

R.5 *Yes*

R.6 *Yes*

R.7 *Yes*

R.8 *Some sites are, Some are not.*

4.9 What network protocols are employed?

R.1 *N/A*

R.3 *IP & IPX*

R.4 *TCPIP (transmission control protocol internet protocol)*

R.5 *TCPIP, DHCP*

R.6 *TCPIP*

R.7 *TCP/IP*

R.8 *TCP/IP for networked sites.*

4.10 Is software installed locally on each computer, and/or installed centrally on LAN servers?

R.1 *locally*

R.3 *Both*

R.4 *Site computers are LAN connected with software installed centrally. The CEMS is a stand-alone with local installation.*

R.5 *Under 5 users locally, over 5 area support and greater than 15 corporate support.*

R.6 *Both centrally and locally*

R.7 *Both*

R.8 *Locally for non-networked PC's. Both for Networked PC's.*

4.11 What Software packages are currently supported?

R.1 *All Microsoft software*

R.3 *Office 95 (word, excel, access, powerpoint, etc), VB*

R.4 *Microsoft Office and miscellaneous site specific applications are supported.*

R.5 *To many to list, each application has to be certified for use on Syncrude LAN*

R.6 *Microsoft Office 97*

R.7 *MS Office, Process Software, etc.*

R.8 *You name it, we probably use it somewhere. Microsoft Office 97 for productivity applications. IE5 is the web browser. Email client is Outlook 98 with centralized Exchange server in Calgary.*

4.12 Please indicate any database systems that are currently supported:

- Database Products

R.1 *ICIS, EXCEL*

R.3 *oracle, access*

R.4 *Database Products and Database configuration are currently supported.*

R.5 *Access 97, Oracle, Sybase, SQL Anywhere*

R.6 *Access 2 and 97, Oracle, SQLSERVER*

R.7 *Yes*

R.8 - - -

- Database configuration (client-server or local computer installation)

R.1 *local*

R.3 *Client-server and local*

R.4 - - -

R.5 *Server installed although laptops are local*

R.6 *Both*

R.7 *Yes*

R.8 *MS Access 97 – Local; Oracle – Client/Server*

4.13 Are the following protocols supported ?

- ODBC

R1 *don't know*

R.3 *Yes*

R.4 *Yes*

R.5 *Yes*

R.6 *Yes*

R.7 *Yes*

R.8 *Yes*

- SQLNET

R1 *don't know*

R.3 *Yes*

R.4 *Yes*

R.5 *Yes*

R.6 *Yes*

R.7 *- - -*

R.8 *Yes*

- FTP

R1 *yes*

R.3 *Yes*

R.4 *Yes*

R.5 *Yes, needs approval*

R.6 *Yes*

R.7 *Yes*

R.8 *Can be if necessary at the server level.*

- Other

Connection to the internet.

4.14 Do staff have access to the internet?

R.1 *yes*

R.3 *yes*

R.4 *No general employee access to the internet.*

R.5 *With approval, not all users have access*

R.6 *Some*

R.7 *Yes*

R.8 *Some sites do, some DON'T.*

4.15 What type of connection is available?

R.1 *Modem & server*

R.3 *High speed internet connection*

R.4 *N/a - central corporate modem system only*

R.5 *Shared through a proxy*

R.6 *T1*

R.7 *T1*

R.8 *WAN at some sites, Dial up at others.*

4.16 What is the connection speed?

R.1 *don't know*

R.3 *10 mbs*

R.4 *Don't know what the speed of the central modem system is.*

R.5 *Unknown*

R.6 *56K for T1, depending on location*

R.7 *T1*

R.8 *From 28.8 to T1, depending on site.*

4.17 Are there any restrictions on using the internet (can staff access non-corporate systems and information sources)?

R.1 *yes*

R.3 *no*

R.4 *Yes - no general employee access to non-corporate systems or information sources.*

R.5 *No*

R.6 *Some sites are blocked*

R.7 *Employees can access outside sites for business purposes*

R.8 *YES. Some sites cannot access beyond corporate firewall.*

4.18 Do you have a corporate firewall?

R.1 *yes*

R.3 *yes*

R.4 *Yes there is a firewall.*

R.5 *Yes*

R.6 *Yes*

R7 *Yes*

R.8 *Yes*

Web Browsers

4.19 Does your staff have access to web?

R.1 *yes*

R.3 *yes*

R.4 *No general employee access to the web*

R.5 *See Above*

R.6 *Some*

R.7 *Yes*

R.8 *Mostly yes, Some don't.*

4.20 What type and version of web browsers are currently supported?

R.1 *Microsoft Explorer – latest and greatest version*

R.3 *Netscape*

R.4 *Where applicable, IE3 and soon to be IE5*

R.5 *IE5*

R.6 *Microsoft Explorer 4.0*

R.7 *IE4*

R.8 *Microsoft Internet Explorer Version 5.0*

Email

4.21 Does your staff have access to email?

R.1 *yes*

R.3 *yes*

R.4 *Yes access to e-mail*

R.5 *Yes*

R.6 *Yes*

R.7 *Yes*

R.8 *Remote locations do not have any communication infrastructure suitable for data transmission, this affects one of our approved plants.*

4.22 Are there any restrictions regarding the use of email?

R.1 *Possible size restrictions.*

R.3 *Can't send more than a 5 meg file*

R.4 *Yes on restrictions to e-mail. This is limited to authorized corporate usage only and no attachments can be sent or received.*

R.5 *All email is quarantined to the next business day to be scanned for viruses. Size limit for attachments*

R.6 *No*

R.7 *Email is for business use only.*

R.8 *Not currently, but some attachment types will be refused in the future.*

FTP

4.23 Does your staff have access to remote FTP servers?

R.1 *don't know*

R.3 *yes*

R.4 *There is FTP capability.*

R.5 *No*

R.6 *Yes*

R.7 *Yes*

R.8 *YES, if they have access beyond the corporate firewall.*

4.24 Are there any restrictions regarding the use remote FTP servers?

R.1 *don't know*

R.3 *yes*

R.4 *FTP capability is only available within the company.*

R.5 *No*

R.6 *No*

R.7 *?*

R.8 *No, if they can get past the firewall, they can use any FTP site that they have an account->password for.*

4.25 Can you support FTP as a protocol for submitting information?

R.1 *yes*

R.3 *yes*

R.4 *Yes - indirectly*

R.5 *No*

R.6 *Yes*

R.7 *?*

R.8 YES, but user computer experience is quite variable. FTP should happen with a "click of a button" on the users part.

5 Other Comments

In this area, please list any other questions or comments that you have.

R.1 *Dow Chemical appreciates the opportunity to comment on the RAPIDS pilot project. We agree that electronic submission of data is preferential over paper submission of reports. However, we feel very strongly that RAPIDS is not the answer to this issue. RAPIDS may be free but, as demonstrated to us, is not the appropriate tool to be used. In the workshop in December 1999, a professional computer expert could not get the software to work for a simple coal fired power plant with a single fuel source and single stack emission. For a complex chemical facility such as Dow Fort Saskatchewan, the implications of implementing this software are completely negative.*

R.2 *Overall we applaud the efforts of Alberta Environment to move to a system that would provide a more efficient way to transfer monitoring information. However, we are concerned that the RAPIDS system is too complex and tries to fill the dual roles of "electronic data transfer tool" as well as "emission inventory estimator" While the RAPIDS system is very comprehensive in nature, the complexity of inputting and operating the systems on a day to day basis may prove to be more burdensome than the current process of paper submission of data. We hope Alberta Environment continues to work at this in the future.*

R.3 - - -

R.4 *As I have identified there are alot of restrictions at Imperial Oil on the use of internet, e-mail, and other external information sources. Any expanded usage of these types of systems is not authorized at a site level (i.e. at the Strathcona Refinery). Any exceptions would require Corporate upper-management involvement and approval. This would not be an easy or short process. With that said, my intent is just to emphasize that there are restrictions to our Information Services Systems. An electronic reporting system thus may not be appropriate or feasible for some facilities.*

R.5 *Of most benefit to us would be an electronic reporting system that would reduce paper reports to AENV. We do not want to make reporting more complicated and would be all for a system that focuses on streamlines reporting. Any system of electronic reporting that AENV decides to use should be easily understandable and supportable and be based on programs commonly used in the current workplace.*

R.6 - - -

R.7 *Regarding - would you like to have your responses compiled verbatim into an appendix for the RAPIDS pilot project report? Or would you prefer to just have a*

list of names and companies listed? This report will be made available electronically on our website, and in print upon request. - ANS: A list of names and companies should be sufficient.

R.8 *IT departments will need a lot of lead time if the intent is to pull the information from the various DCS systems into RAPIDS If the intent is to enter information via keyboard, to process maybe too time consuming to be considered a valuable exercise.*